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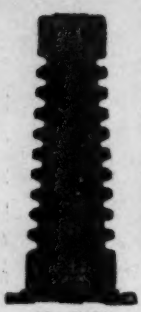
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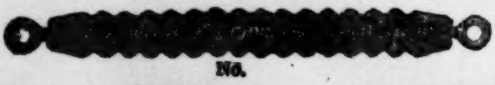
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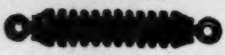
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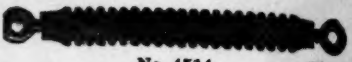
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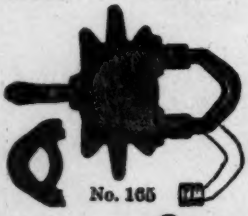

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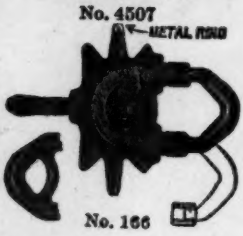
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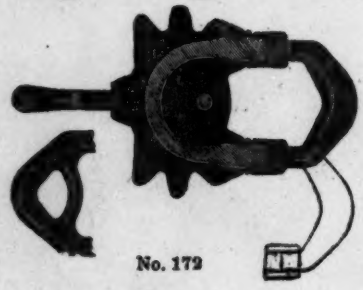
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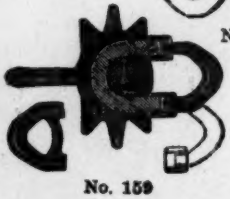
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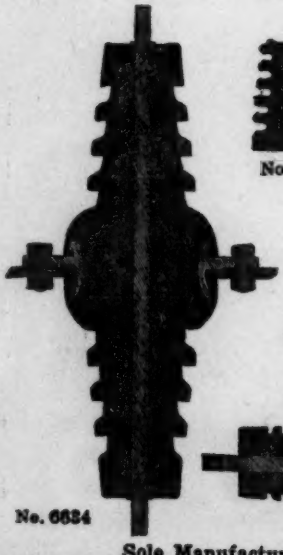
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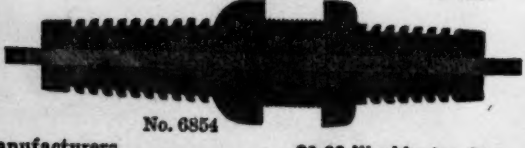
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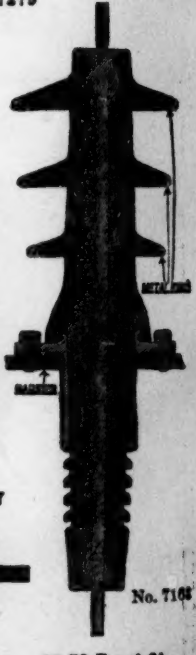
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* Altitude, Azimuth and Line of Position Tables (includes Aquino's Tables) H. O. 200.	.60	Hydrographic Office.
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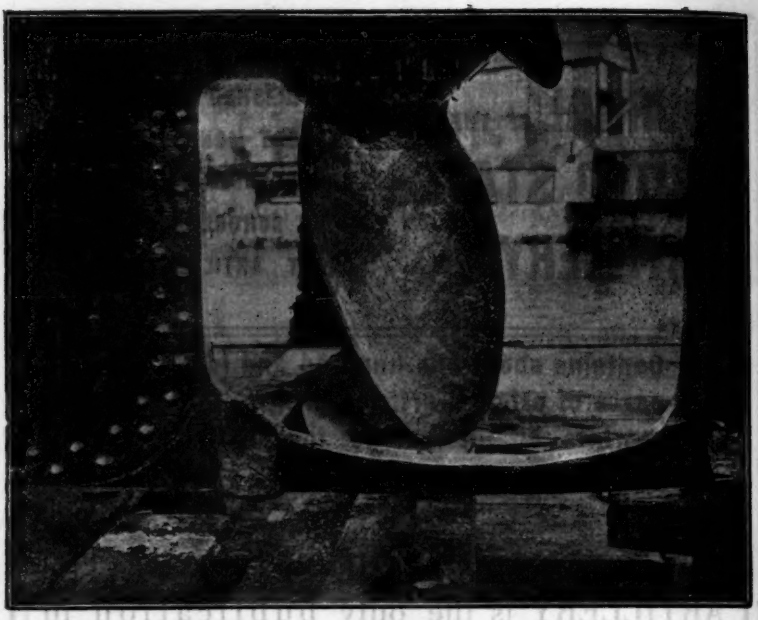

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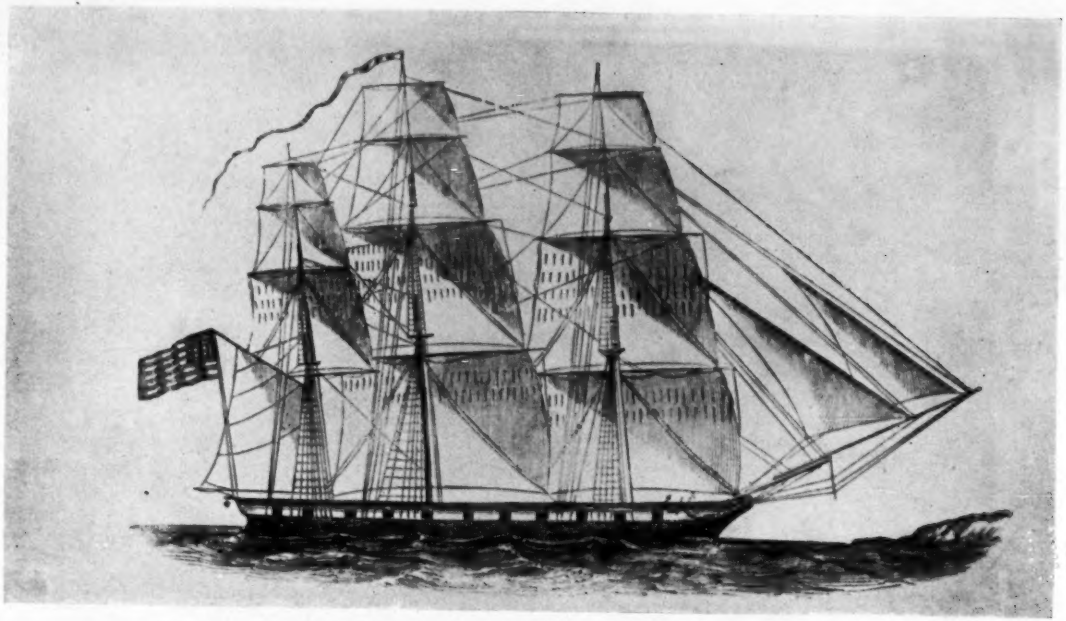

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First Honorable Mention Essay, 1918

THE PREPAREDNESS OF THE FUTURE

By COMMANDER H. O. RITTENHOUSE, U. S. Navy (Retired)

Motto: "When a strong man armed keepeth his palace, his goods are in peace"

PEACE AND PEACE

Words like any other code of human signals are subject to misinterpretation. It is sometimes possible to express the same thought by different symbols, and it also frequently happens that the same symbol may be interpreted in more than one way. Every page of the dictionary gives evidence that words in general are not sharply outlined in significance, but rather seem shrouded in a penumbra of greater or less area by which they shade off into various and sometimes almost contradictory meanings. In a purely scientific discussion we endeavor to make meaning clear by conventional definitions. But great social problems involving complex human elements do not readily yield to the scientific method, and because of this we use terms in their ordinary acceptation, trusting that we may not deceive ourselves or mislead others. The results are sometimes unfortunate.

The word *peace* is one that may easily mislead us and, because of it, reasoning has not always been clear and conclusions not always justified. One very general understanding of the word peace is simply the non-existence of a state of war. And by *war*

we here mean armed conflict with public enemies, foreign or domestic. In this sense the word takes no account of other struggles, hardships and dangers in which we might be involved. That is, to have peace is simply not to be at war. Whenever this kind of peace is desirable it is the easiest of all things to obtain. It always takes at least two to make a fight. Refuse to be one of the two and there is no fight, and therefore peace. Peace, in this sense, is always at hand, whether with the brute who violates a home, the mob destroying property and life, or the nation that would overpower us. This is the peace of non-resistance. It is a very natural thing indeed, but a radical error, for the people of a country who have enjoyed great happiness and prosperity in normal times, to believe that these blessings are the direct result and the deserved reward of not having armed public conflicts. To such minds peace presents itself as a *cause,* happiness and other blessings the *effect.*

Now there is another and a very different idea conveyed by the same word. Peace in this second sense is distinctly a *result.* It is the tranquillity and satisfaction of both body and mind that follow right conduct and worthy effort. It is the harvest and fruitage after the toil of sowing and reaping; it is the enjoyment of health and happiness that comes from a life of temperance, self-denial and fair dealing. Collectively it is the aim of civilization, the desire of all nations, the hope of the world. It can never be obtained by inaction and non-resistance. On the contrary it must be purchased at the cost of struggle and sacrifice. The contest, for individuals and nations alike, is waged in both material and moral fields. Food, shelter and clothing must be obtained, rivers crossed, mountain barriers overcome, and disease eliminated. Selfishness, greed, poverty, vice and crime are to be suppressed and human relations established on the basis of universal justice. Such is the stupendous program that faces mankind. It is not of his choosing and it cannot be evaded. The plan of action is the task of true statesmanship, and the battle itself must be fought by brave men who flinch at no hardships, and who will endure no wrong. We cannot hope to name the day of complete victory. We press on to closer and closer approximations, sustained by the knowledge that every hard-earned advance brings its commensurate reward. Such peace is an end and not a beginning, a consequence and not a cause.

It is certain that many sincere and well-meaning pacifists are mentally confused by failing to distinguish between these two very different meanings of the same word. They mistakenly believe that from the sickly peace of non-resistance will immediately issue the rewards reserved for those only who make heroic struggle and sacrifice for righteousness.

THE NORMAL LIFE, WAR AND PREPAREDNESS

In spite of the fact that history shows an almost unbroken record of wars, we are inclined to regard a state of war as exceptional to normal life, and we even cherish the hope that the exceptions are rapidly becoming more rare. When such view is entertained, it is inevitable that preparation itself will be regarded as exceptional, likely to be unnecessary and, at the best, an unprofitable investment. Thus we become slow and reluctant to take action, and our measures are sporadic and inadequate.

If however we look more closely into what we have called the normal life, it will be clear that contests with armed enemies constitute no such marked exceptions as we have been accustomed to believe. Not only do such contests come with a frequency that should keep us ever alert, but the normal life itself involves hardships and sacrifices qualitatively on a par with war, and often closely approaching it in volume and intensity. Year by year, fire and flood demand their toll of life and property and we must toil and rebuild anew. Tempests, earthquakes and disease decimate our ranks. Men are killed and crippled in factories and mines as in battle. Immorality, vice, crime and injustice double our burdens individually and collectively. There seems no escape from these evils in either time or space. Suffering and tragedy find their way into our homes as readily in times of so-called peace as in time of war. The normal life is a continual challenge to a warfare that demands the same virtues of courage, endurance and sacrifice that are associated with public armed conflicts. It seems more logical therefore to regard war as one of many items in a long series of evils, rather than as a distinct, exceptional experience. It may indeed be the culminating item among these evils, but an item nevertheless with many marks that establish it in the common class. War and peace, in fact, are but extreme phases of continuous national struggle. When the struggle is bitter and severe between national antagonists, we call it war; when it is

less violent and confined to coping with adverse national forces in providing human needs, we call it peace. In passing from a state of peace to a state of war we do not exchange one kind of burden for another; we superpose the additional burdens of war upon the already existing ones of peace.

Since then war is not fundamentally differentiated from the major evils of the normal life, but the burdens and struggle in greater or less degree are ever with us, it is manifestly unwise to confine our ideas of preparedness to the narrow scope of purely technical military needs. It is not enough to determine and supply the number of horses, men, weapons, ships, aircraft, etc., that may be needed. Thorough preparation will, first of all, take cognizance of the vital factors in the normal life and so organize men, material and resources that in the event of war not only will the military branches be ready to operate effectively, but the entire nation will be prepared to contribute its full measure of support, power and endurance to the struggle. The vital processes of the ordinary national life must still be sustained under greater load.

Such fundamental nation-wide preparation might more properly be regarded as a preparation for peace. Its very existence averts aggression and discourages attack. It looks to no time serving, makeshift or fortuitous peace, but through painstaking constructive effort to the durable peace upon which the faith of civilization is fixed.

It is keeping the nation "fit" in all respects for its normal tasks precisely as an individual should at all times keep his body and his business affairs in the highest degree of efficiency. Under such conditions we enjoy the double advantage of realizing the best that peace affords and at the same time providing the best possible preparation for all the greater adversities to which nations are subject.

Even if the purely military elements are assembled in satisfactory number and quality they will not avail in a contest where endurance is the decisive factor. How far would the big fist and strong arm of an individual carry him in any physical struggle if the vital organs of his every-day existence were weak, diseased and undeveloped? Experience is indeed a dear teacher; but her lessons are worth the price if they can be learned no other way. Has our short experience in the present war yet taught us that success depends primarily and ultimately upon such things as

bread, wool, coal, gasolene and contented field and factory labor? These are at all times the common denominators of life, and it is plain that victory hinges upon their adequate supply no less than upon the purely military elements at the trenches.

The principle involved has equal application in the spiritual domain where the issues of life are so largely determined. The moral qualities of unselfishness, courage, sacrifice and endurance, essential to success in the minor but inevitable contests of life, are the identical ones that are indispensable in war. It is not alone those at the front who must be dominated by an unconquerable spirit that fears defeat more than death, but those at home as well whose equal duty it is to serve and bear burdens of anxiety and grief without flinching from the yoke. Defeat by superior force of arms may be unaccompanied by disgrace; but no greater tragedy can befall a nation than to suffer defeat or submit to oppressive terms through speculative profiteers, purchasable treason, or weak-kneed pacifists behind the lines, while her armies are not overcome. Thus the moral soldierly qualities upon which we rely for success in war are not of peculiar or mysterious origin, but are recognized as the homely virtues we undervalue and neglect in our common life.

We cannot fail to note that the necessity for such basic preparation is equally imperative, whether wars go on or cease. If they continue, the necessity is plain, for it is the life of the nation that must sustain the war, and this life must be kept at its best. But if the miracle should be wrought, and armed contests cease, it seems equally clear that the ambitions of men and the competition of nations will merely result in establishing the contest upon a more pacific plane, where the conditions of dominancy and survival will require precisely the same, or even a more elaborate, preparedness. The prospect, however, for such an attractive régime seems far from bright. If the world was deluding itself with the dream of an idle, selfish, indulgent peace, to be enjoyed without sacrifice and without the power that comes from physical and moral struggle, it has been rudely awakened. He is a bold prophet indeed who predicts that voluntary and general disarmament will be written in the agreements of the council table, and that nations will give willing consent to measures that restrict their means of self-defence.

Following the war there will be a long period of national readjustment that logically must take the direction of more highly-

wrought economic and industrial organization than we have been accustomed to in the past. The financing of the war is creating an indebtedness that will bear heavily upon the people, and the task of easing the load as much as possible and securing the full measure of justice to all classes will severely test the strength of our democracy. Even if it were desirable, it will be impossible to go back to ante-war conditions and methods. There will be hardship and disappointment for many, and the entire national body must learn to sacrifice accustomed margins of profit to the widest and fairest distribution of the common proceeds of united endeavor.

Other nations will face similar conditions, and in the ensuing rivalries for advantage, rivalries which are, in fact, the unformulated determination to survive, success will rest with those who can best organize, sacrifice and endure.

By preparedness, then, we have in mind that condition of national being that will enable us to apply at all times, to the utmost advantage, the powers and resources indispensable to free and happy existence. When we reflect that our human lot carries no exemption whatever from the vigilance and activity necessary to the welfare of all animated life, it becomes evident that adequate preparation must be broad in scope and fundamental in character. It would be a serious error therefore to conceive of preparedness as something pertaining exclusively to a state of war. But we would be culpable indeed if we minimized the importance of such special preparation. It is understood of course that preparedness includes the development and training of naval and military forces, and the skillful use of the best weapons and devices that invention can produce. Advocacy of these measures will be assailed as "militarism" by timid souls who shrink from the sound of any word that suggests the suffering, the sacrifices or even the virtues of war. Their specious arguments would destroy effective defence of rights, liberties, homes and heritage against the outlaw and oppressor.

Manly prowess, the ability to defend oneself and one's family, the power to uphold right and suppress wrong is a supreme virtue. It is only its perverted application that deserves condemnation. This is no less true of a nation than of an individual, and it is only in the unholy purpose to which national power may be applied that militarism becomes a reproach.

MATERIAL ELEMENTS OF PREPAREDNESS

A study of human activities may be resolved into a consideration of the basic elements called matter and force.

We transform and transport material things through the agency of the natural forces that we have learned in some measure to control. When force acts upon matter, power is manifested; and when we so control matter and force that the application can be made at the moment of our choice, we have potentiality; that is to say, power may be active or latent.

Fundamental preparedness therefore involves a study of all the material things that affect our well-being, together with the means at our disposal for adapting and applying them to our use. These material things are of great variety, covering different fields of usefulness and having wide ranges of value according to our needs and the abundance or paucity of supply. They range from such vital matters as food products to trivial conveniences; from sand to productive soils; from grasses to forests; and from water to the valuable ores. Of these the study should embrace our own available supplies and substitutes and the sources from which important deficiencies can be depended upon. It should develop the normal consumption of the important items and the increased consumption that may be demanded by war. It should include measures of conservation and limitation of output, in order that our national substance may not be wasted in riotous living to the detriment of our descendants, but rather that each successive generation may be a tenant for life, to use without waste, while the estate continues unimpaired.

Such study would include likewise a survey of all important industries and of the available natural powers applicable to the desired transformation and transportation of material. This covers such items as agriculture, commerce, mining, manufacturing and distribution. It would cover the full possibilities and the wise development of our water supply for irrigation, for inland routes of transportation, and for general power purposes. It would cover all experimental work looking to the application of winds, currents, tides, volcanic heat, solar radiation, etc., as useful agencies of power. It would cover road building in all its branches, for traffic by rail, auto cars and farm wagons.

Such itemization is in no sense complete, but is illustrative only as indicative of the purpose in view. Efficient and thorough work

of the kind suggested could be accomplished only by a body of experts with ample means of collecting data and skillful in the compilation and use of statistics. They should be men of high intelligence and broad information regarding the policies, resources and restrictions of the leading nations of the world; and should be able to formulate the policies and measures best adapted to advance our own national interests. They should discover the times when competition between great industries has outlived its advantages, and should devise measures to replace it by co-operation. In a word, they should be national business experts holding the same relation to our government that the modern efficiency expert holds to the corporation he serves. Such a body might be called a Commission of National Resources and Efficiency. It should be under the immediate direction of a Department of Government, and its data, recommendations and reports be available for executive or legislative action and for private enterprise.

While war needs would be fully embodied in the scheme, they would not constitute the chief motive for the activity of the Commission. Such motive must be found in the desire to meet the needs and forward the aims of all the people in normal times, in a way at once efficient and harmonious. Such motive would spring from the knowledge that a contented people, living on the highest plane of progress and efficiency, is at all times fundamentally ready for any adversity and in the event of war need only take up its weapons. In a supreme struggle, neither individual nor nation can hope to improvise basic conditions of vitality and power that command success. These are of slow growth, the product of patience and wisdom, the essential attributes of the statesman.

The imperative demands of the present war have led to the formation of numerous councils and boards whose functions are not always clearly defined and which may overlap and even duplicate each other. Constituted hurriedly in the hour of necessity, they are make-shifts to tide us, if possible, over a crisis. That we grasp so spontaneously at these means is the proof positive that such need as they endeavor to supply is real and urgent and should be anticipated before the day of trouble.

Upon such carefully prepared data the more specialized public and private enterprises could be developed to advantage. Foremost among these would come the specific preparation for national defence. Coast defence, inland water routes, rail and automobile

routes, and aviation stations would be planned, and provision made for the manufacture and storage of war material to the minutest detail. This is peculiarly the work of our military experts, both army and navy, and may safely be left in their hands as heretofore. While it is not the purpose here to enter into specific professional matters, the temptation is irresistible to suggest aeronautics as the most important field in which the great war developments of the future will be made.

Our agricultural interests are of vast importance as fundamental to national well-being, and they demand the wisest provisions for maintenance and development. Food and clothing are imperative necessities. As compared with older nations, we are poor farmers and gardeners. Much productive land is untilled while ill-nourished families cling to city tenements. We are wasteful of our crops both in field and home after we have grown them. We exhaust the natural fertility of our soils and abandon them to seek others rather than restore them by careful husbandry. Of course, such practice is largely due to the fact that we have not yet fully possessed ourselves of the bounteous natural supplies of a new and rich country. We still are "living in clover." But these conditions are already changing and we must soon practice the economies of older peoples. Public expenditure to assist those who produce our food and to encourage people to find their living from mother earth is wise investment. In the last analysis the social structure rests heavily, if not wholly, upon "the man with the hoe."

As another example of important subject matter, we may mention international commerce. It has ever been a most fruitful cause of war. The "permanent" peace of the world so hopefully predicted by some, so earnestly desired by all, will be measurably nearer when the vexatious questions arising from colonial enterprise and commerce are brought to unselfish national agreement. The big obstacle in the problem is contained in the word *unselfish*.

Commerce itself presents to our minds quite different aspects according to the phases under which it is considered. If we have in mind a collection of friendly nations, without clashing ambitions, whose peoples are content with life within their respective boundaries, we can conceive of commerce among them as a most pacific and beneficent institution, whereby desirable commodities

are merely interchanged without significant profit, and the only expense is the fair compensation to the carrier.

But commerce as it is actually practiced by the leading nations of the world presents a very different picture. The nations are by no means all friendly. They have conflicting aims. The people are not all content within their own borders and seek expansion by colonization. Some nations are strong, others are weak. Some are civilized, others untutored. There are large areas of the continents and some of the islands yet offering abundant natural resources of great value that cannot be appreciated, used or defended by the weak people occupying them. Greed cannot resist these temptations and, under the camouflage of "development," "progress," or what not, commercial enterprises are organized. The motive that actuates the leading spirits in these large transactions is financial gain. They endeavor to trade at the utmost advantage to themselves and eventually get something for nothing. The profits are brought home partly to be enjoyed by themselves and partly to be distributed among the people who convert raw material and distribute the manufactured products. When all works well this brings about a condition called "prosperity." All the great nations, of course, want prosperity, and its chief source is from the outside. In fact, to have general prosperity in a nation by inside trading only is about equivalent to lifting oneself by the bootstraps. Governments therefore encourage commerce notwithstanding the armed conflicts to which it so often leads.

The material force which, down to the present time, has steadied and regulated commerce with more or less justice, has usually been in the hands of one or more of the nations, dominant for the time being, and its exercise has been termed "control of the sea." The advantages to those who exercise this control render it a prize that makes peace always unstable. The world is now seeking relief from this situation by some new program sometimes referred to as "freedom of the seas." The term as yet has no settled significance and the program is but embryonic. Freedom of any kind, however, is never absolute. There is no valid liberty or freedom without law. Freedom of the seas, whatever it may come to signify, must in some way be supported by material force to maintain our conventions; and if such support, or control, is to be any improvement upon past conditions, it would seem to lie in

concerted arrangement among a sufficient number of the great powers to make resistance on the part of the others futile.

Our country will demand its equal part in control and in participation of the world's commerce. It may go further and demand a world-wide open door with special privileges to none. The control will be represented by naval force, and our participation must be as active carriers as well as mere profiteers. Without the means of thus serving ourselves, we would easily be cut off in an international crisis. Our economic and industrial conditions make it practically impossible for us to compete naturally with the cheaper labor of foreign nations in the building and running of ships. We must therefore have direct government aid in these matters to safeguard the vital interests involved. Whether this aid is in the form of open or disguised subsidies or in the form of direct government operation is of minor consequence. The essential matter is the freedom and security that only our own ships, manned by our own seamen, can give.

It would be quite impossible in the compass of a brief paper to even outline the more important items of a material nature bearing directly upon the strengthening of our country. The items themselves are abundant and need not be listed here. The important point however is that it is *during* the normal life, and *for* the normal life that these provisions should be made.

If there has been any such comprehensive, careful planning, having in view the general welfare, it has not been made operative. Individual enterprise has been the usual procedure and the chief reliance. Such means may be the natural mode of development in a new country, thinly populated and offering attractive opportunities to men of courage and action. But there is neither system nor method in such means. The results are hurried legislation on the appeal of lobbyists, conflicting interests and claims, the development at times of suicidal competition and direct robbing of the people through criminal transactions in corporate stock. As the population becomes more dense and the common interests are seen to suffer by jarring conflicts, the necessity of method and system is obvious.

THE HUMAN ELEMENT IN PREPAREDNESS

Wars may be won in the future, as sometimes in the past, by the longer purse, or again by the larger battalions. These are indeed desirable advantages and, other conditions equal, would naturally

be decisive. But ofttimes "the race is not to the swift, nor the battle to the strong," nor can victory always be purchased by gold. Material things for the most part are of themselves inert or passive, and chance is an unreliable friend and a treacherous foe. But so far as control is possible and chance can be eliminated, the superior factor in war as in other fields of human endeavor, is man himself, the living element, the embodiment of will. In him is both matter and force so intimately compounded that the dividing plane between them, if indeed there be one, eludes our scrutiny.

In the general preparation for national fitness which has already been urged, and in the special professional preparation for defence, we recognize the full importance of material resources, weapons and skill; and in their development and application we cannot be too progressive. But important as these are, they yet are secondary. Outclassing them and prior to them in logical sequence comes the quality of citizenship that composes the nation. A nation weaker than another in the essential virtues of mankind is under initial disadvantage that will ultimately manifest itself in defeat, whatever the nature of the contest. It will be surpassed in the rivalries or peace and humbled in the strife of war. It is the mysterious power in man himself that fashions material, enslaves the forces of nature, and wills into realization the most daring visions. Thus the richest asset of any nation, surpassing in value its wealth of forests, minerals, flocks and herds is its human composite of body and mind.

But the output of humanity is not a uniform product. Individuals vary in physical and mental traits and in their powers and capacities, and social units display equal differences. East and West have their antithetic civilizations, and the narrow life of the Esquimau has little in common with the varied interests and luxuries of the temperate zones. Habits of living, occupation, food and general environment have their certain effect upon both body and mind, while the combined influences of religion, ethical and social ideals, and the specific training of youth, have at least equal force in the formation of national manhood.

We seek the highest standard of manhood. We want the healthiest bodies and the soundest minds possible. In athletic contests we all know the advantages of skill and the necessity of training; but do we realize that for supreme success the contest-

ants themselves must be selected individuals? Superior physical and mental qualities manifesting themselves in strength, weight, will and endurance are necessary to produce a champion. "We cannot make a silk purse of a sow's ear," neither do "men gather grapes of thorns." Little use indeed of training an anemic, undeveloped tenderfoot for events in the heavy-weight class.

It is the essential manhood of our nation, the human stock of physical and mental power, by which, for weal or woe, we shall write our historical record. Nature and circumstance have combined to give us domain and resources beyond ancient realization or dream, and if we fail of honorable achievement, our fate will be the deserved consequence alone of weakened and vitiated manhood. If we aspire to the worthy success that constitutes the glory of great nations who have preceded us, and hope to enrich posterity by a still more enlightened and beneficent civilization, we must, before all else, establish our foundations in physical and moral integrity.

By personality we have in mind the qualities, attributes and conduct that distinguish an individual from his fellows. It embraces in particular his physical and mental traits. By nationality we have the corresponding conception of the qualities, attributes and traits that distinguish a nation from other nations. But as a nation has no identity except as a composite of its individual elements, so nationality, or national character, can be apprehended only through the medium of the individuals composing it.

On this basis is our national character satisfactory to us? Is it of high order? When our individuals are compared class by class with those of other nations, can we claim superiority in physical health, power, vitality and endurance? Do we surpass them in fundamental virtues, in moral rectitude and in the appreciation of unselfish social justice? Are we more skillful of hand, or more clever of intellect? When we consider among us, on the one hand, the weak, the diseased, the immoral, the criminal, the ignorant, and the insane, and on the other the strong, the healthy, the virtuous, the good, and the intelligent, do the desirable qualities so predominate that we are justified in complacent confidence? Moreover, and more significant, do we know in which direction the scales are turning in these vital matters? Are we improving or declining in the elements of strong and vigorous citizenship? While current statistics of disease and insanity and

the criminal records of our large cities furnish material for grave reflection upon these questions, it is not the purpose here to discuss them, but simply to engage attention to their serious importance. It is as impossible for a nation, as for an individual, to enter upon a profligate, self-indulgent and pleasure-seeking career and escape the vices that spell physical and moral decadence.

To develop and maintain the highest standard of physical, mental and moral manhood in its citizenship is the vital problem of any self-respecting, self-reliant, forward-looking nation. Its correct solution will be verified in the answer of power and righteousness, without which no nation can long endure, as the records of both prophecy and history abundantly testify.

THE TRAINING OF YOUTH

The problem centers in the training of children and youth, the natural, if not the only possible, stage of life wherein manhood can be effectively moulded. In what follows, the endeavor is to emphasize the important aims, point out difficulties and manifest errors in present-day practice, and offer remedial suggestions. A human personality will be regarded as a compound of body and mind. The term mind, therefore, is used in its most comprehensive sense to embrace everything that is not obviously material. Thus the emotions, the will, intellect, memory, etc., are departments or phases of mind, and when mentioned the reader will conceive of them as parts only and not the whole. Those who believe in a trinity of elements including what is sometimes spoken of as spirit, or soul, are asked to shelter this also under the general designation of mind. This is merely a convenient definition to secure common understanding and is not advanced as a theory to be defended.

From the viewpoint of natural development, physical health is the foundation of successful life. Man is manifest to us first as an animal. Even the infancy of the individual mirrors to us the infancy of the race, as we see the babe come into the world with adequate physical equipment before it can manifest self-consciousness.

Robust physical health, every organ and every cell vibrant with life and energy, untouched by disease, represents to our thought the first requisite of perfect manhood. Starting with this endowment alone it is possible to forecast all the triumphs of civilization

Thus human power and human happiness, the pursuit of which is our undeniable heritage, rest primarily upon physical wholeness or health.

But mind and body are combined to produce a mysterious unity. Their mutual reactions are so certain and complete as to suggest an ultimate identity. Priority cannot be asserted with confidence. There are those who influence and cure physical ailments by mental treatment. Physicians habitually seek first of all to inspire hope and cheerfulness in their patients. On the other hand, it is an every-day occurrence to remove mental defects by scientific surgery.

If, therefore, we could attain an ideal perfection of body and an ideal perfection of mind, the combination would be ideal manhood. Thus are we led to the homely truth and simple program upon which great nations of the past were reared. In the training of youth no clearer, simpler, nor more comprehensive expression of aim has ever been formulated than the classical maxim, "A sound mind in a sound body." Upon what other or more stable foundation can a nation hope to endure in goodness and power than vigorous bodies, untainted by disease, and sound minds free of disorder and vice?

Any misgivings as to the reasonableness of these conclusions are quickly dissipated in the clear light of history. In Greece, for example, youth were trained physically and morally in their homes by parents and in the camps and gymnasiums by teachers. The body had its special discipline; pride in physical excellence was encouraged and its attainment rewarded. The mind was softened and harmonized by music and enlarged and made sympathetic by memorizations from the poets. From such simple methods resulted a civilization that still furnishes many of the standards of modern culture.

Rome adopted much of the Greek method and fortified it by strengthening the discipline in the home where the father had almost absolute authority over his children. Obedience to parents and to the state was accounted among the highest virtues, and respect for the law pervaded the empire from capital to remotest province.

Possibly the most striking illustration is found in the Hebraic records. The rules established by Moses for the upbuilding of his people were characterized by the stress laid upon physical and

moral purity. Cleanliness of body and care in the preparation of food were balanced on the spiritual side by a moral code so essentially fundamental and satisfactory that succeeding social systems have found no better. By the insistent training of children in these elemental virtues, under conditions precluding the possibility of anything like modern books or schools, a body of slaves and rude peasants, wanderers of the desert, was transformed in a few generations into an organized nation that produced political leaders, statesmen and poets whose influence yet remains a most potent factor in Western civilization.

To master the horse, to use their weapons, to speak the truth and to honor womanhood; such was the basis upon which princes were trained in the days when knighthood was expressed in terms of courage, service and loyalty. Strong physical constitutions, disease resisting, and wholesome minds dominated by virtue, have ever been and will continue to be the basis of human power. As naturally and as certainly as a good tree in good soil produces its wealth of foliage and fruit, so will come spontaneously from these elements of manhood the fruitage of all human excellence; statesmen, artists, poets, warriors, philosophers, and all else that may be demanded by worthy aspiration. Without such foundation, individuals and nations, alike and together, suffer the fate of the house built upon sand.

It is not without significance in this connection that, while fundamental training has been neglected almost to the point of abandonment in our civil public educational institutions and is fast disappearing in the home life of our city masses, its vitality has been preserved through the unbroken line of military necessity. Military authorities from the most ancient times, in their endeavor to develop human power, have realized that it is based on health and character. The benefit and virtue of all military training lie in these things first, and only secondarily and incidentally in the rapid movement of groups and the skillful use of weapons. It is because of its efficiency that such training is used by military men. No one claims that it is the best because it is called military; but it is military because it is the best.

In face of these facts our leaders neglected sound preparation because of fear of "militarism," and our educational authorities carefully withdrew their sacred gowns from contact with military training. Ignorant alike of its methods and virtues, they de-

nounced it as depressive and brutalizing, while the records overflow with the testimony of the deep humanity, the nobility of character and the heroic sacrifice that have ever been the product of soldierly training on land and sea. Strange, is it not, that when the impact of actual war disturbs their placid content and they realize the need of supreme effort in both the physical and moral domain, they forsake their intellectual idols and embrace the principles and methods of their lifelong condemnation! Yet these very principles are as indispensable and potent for the needs of peace as for the victories of war.

That military training develops the highest appreciation of moral values is the verdict of history as we scan the lives of military men. Contrast of the exceptional with the general record makes the truth more vivid. The pages of these proceedings themselves support the contention. The most cursory reading of the various articles published during the last 10 years relating to preparation and success in war, will show them shot through and through with the importance of the moral element, and it is doubtful if they can be matched in this regard by the corresponding output of any other purely secular institution.

There are innumerable factors involved in the development of a civilization, but among them are three institutions whose influence is, in large measure, determinative. These are the church, the home, and the school. These stand pre-eminent as moulding forces of social character and progress. From the religious domain are drawn those forces that mellow and vitalize our spiritual natures and quicken our sensibilities to the impress of right and wrong. From the home we derive basic knowledge and experience of what contributes to our physical welfare. We here acquire also the lessons of obedience, respect for parents and for the winnowed wisdom of experience, the entailed heritage of the ages. From our schools we rightfully expect knowledge, intellectual development, respect for law and authority, and the formation of habits embodying the accepted virtues.

Regarding these institutions, it is plain that the vital matter to consider is their ultimate donation of beneficent impress which is but crudely and imperfectly listed above. We scrutinize their product and have but little concern with their forms and functioning. These are often subject to radical changes which cannot always be credited as progress. Religious thought and expression

change with the generations; home life is one thing in the country and another in the city, and varies in both; while the principles and practice of public education are hopelessly unsettled. But whatever the external form or internal mechanism of these institutions, they must be judged by their results. The acid test of their worthiness is the contribution they make to the physical and moral health of the nation. If they are not working successfully to the common purpose of endowing childhood and youth with strong bodies and sound, disciplined minds, their essential mission will fail, whatever spectacular success they may seem to achieve.

Adequate review of these great institutions is a task concededly too vast and difficult to be undertaken here. But there are some outstanding facts regarding them worthy of notice that have direct bearing upon their individual and collective efficiency. The church does not hold the influence over the people it enjoyed in the earlier life of our nation. This is more particularly true in our large cities, where a pleasure-loving, self-indulgent element and a developing attitude of skepticism have weakened its capacity for service. The Sunday schools are loosely held together by entertainment rather than instruction, and at the best but little can be accomplished in a brief session once a week.

Industrial conditions and social tendencies have conspired to the rapid development of large cities, and for multitudes of children in them there is no real home life or home discipline. Their domiciles are unattractive and often uncomfortable abodes, whose most serviceable function is to provide a sleeping place. Conditions of employment deprive the children of paternal supervision. Many see their fathers only at infrequent intervals. The mother, burdened with household duties, is precluded from efficient care of her offspring, and the children live and are brought up on the street. The family, as the unit of social development, has here dissolved into neighborhood life, colony life, or gang life. These natural street associations constitute, virtually, a new social order, unregulated as yet by any adult agency. This uncontrolled street life and its criminal consequences stand in menacing contrast to the virtuous homes upon which our ancestors founded the nation.

Our institutions of learning, both public and private, are the result of a development that has been far too rapid for the establishment of well-digested systems of training based on wise

national policy. The outstanding features to notice are first, the marvellous influence which these institutions have acquired over our national life. Partly by displacement and partly by absorption they have established undisputed primacy over the church and the home as moulding forces of national character, thereby greatly disturbing the accustomed balance. Secondly, the educational aim has been characterized by intense effort along intellectual and scientific lines, drawing largely from European models, accompanied by unpardonable neglect of sound training in health and character.

Such, briefly, is the existing condition of the chief agencies by which our national character and power are to be developed. Exactly in proportion as they apprehend the true nature and gravity of their task and harmonize their efforts to its accomplishment, will the integrity of our citizenship be established.

THE WEAKNESS OF PUBLIC EDUCATION

Our children of to-day are the citizens of to-morrow. There is no possible way of producing good men and women except by training children to be such. The good man, the good citizen, is characterized by power of body and mind. Physical training for the body and moral training for the mind must be the foundation upon which all specialized or subsequent training is based.

With rapid movement during recent years, the public schools have, in large measure, absorbed the functions of the church and the home in the training of youth, and the process is still going on. As the schools accept this greater degree of responsibility, they must be answerable for the results. The results are not encouraging. Public educators have mistaken their chief duty and the people have deceived themselves by unjustified confidence and trust in a weak system. Education is a term of the broadest possible significance; but its commonly accepted meaning has been so narrowed that it almost wholly excludes fundamental training. In practice, the public school system of the country identifies "education" with scholarship and culture. These, of course, are worthy attainments, but valuable only as the accomplishment and finish of the human product, not as its substance. Our universities, colleges and other private institutions of learning may find justification in such aims, but public education, having a deeper and more vital purpose to serve, can take no doubtful

chances with the foundation and walls of the social edifice. Superstructure and ornament must wait upon safety and durability. The praiseworthy results of the system are loudly acclaimed and well known. They are found in college entrance examinations and in percentages of scholarship. But outside of this narrow domain, where the great masses of our people must get their daily labor, even after their compulsory education, the picture is not so bright. Alienists tell us that the percentage of insanity is increasing. Criminologists tell us that our nation stands among the worst in its record of murders and other serious crimes. Social welfare investigators testify to the increase of vice and immorality. Medical men testify to the increasing prevalence of pernicious diseases. The vast majority of criminal offences by hold-up men, gunmen, gangsters and thieves are by youths and young men from 16 to 26 years of age, all of whom have been subject to our educational methods, and not a few are graduates of our high schools. When our country calls upon its manhood for defence and in some districts over 50 per cent of its young men are rejected for physical reasons, something is wrong.

Failing in our schools to establish the moral qualities as supreme, discipline itself has become weakened, and we are not only accustomed to sporadic rebellion in classrooms, where the sweet influence of woman is relied upon to persuade young bullies to do right, but we witness the wholesale "strikes" on the part of children to force the hands of authority. The first duty of every nation is to train its children, and these children *have not been trained,* however much they may have been "educated."

What other results can be expected when our public educational experts clasp hands with the faculties of our private institutions and join in the one common aim for scholarship? Success of individual teachers, success of principals and schools, success of municipal school superintendents, and, in the ultimate, success of the entire system, is adjudged by the standards and aims of our private institutions. The machinery is geared primarily to the process of making scholars, and citizens come out as they may in the by-product, with false socialism, anarchy and other scrap.

What other results can be expected when the advancement of teachers depends upon their pupils' success in scholarship, and the most highly rewarded qualification is to be an expert coach for examinations? What else may be expected from a system that

rewards scholarship success of its pupils with honors, while sterling character, unless accompanied by an arbitrarily assigned grade of intellectuality, is contemptuously pronounced a "failure"? What, finally, may we expect from a system whose rank and file have not been subject themselves to direct moral training, are ignorant of its methods, and are not required to present it as a part of their professional equipment?

In the training of youth to whatever specific or general end, no greater mistake can be made than that of permitting intellectual brilliancy and culture to blind us to the supreme value of character. Such is precisely the mistake that pervades the administration of public education throughout our country to-day, and its effects in our large cities have already become a menace. The weakest section in the whole fabric of our government at this hour is the lack of good training of the children.

The attitude of our educational authorities, if not positively unfriendly, is one of indifference to the appeal. Some assert that the home, not the school, is responsible. Others believe that to seriously undertake training would necessitate curtailment of book lessons. Still others maintain that there is no direct way to build character; that it is acquired only by indirect processes, such as good literature, good example, good associations, etc. A few uphold the fatalistic theory, that some individuals "catch it" as they do the measles, while others are impervious.

In conjunction with these conditions there has been a too ready disposition to accept novel and radical educational schemes whose chief claim to recognition is the rejection of time tested foundations. It is openly advocated that children should not suffer direction or control except as measures of extreme necessity, and should be left to discover for themselves the disciplined pathways of life that it has taken centuries to disclose. Some go so far as to deny that obedience is a virtue and decry it as the mark of servitude.

It is a safe statement that never before in the history of the world has the cult of intellectualism so dominated the education of youth as it does at the present time. Pure intellectualism at the best is still the half brother of materialism; and when they are permitted to join forces as the controlling elements of civilization, while physical and moral manhood are neglected, we should cease

to wonder at the difficulties of government and the violent outbreaks that disrupt society.

Such doctrines and practice are but timid yielding to "the easy way" in a situation where courage and confidence are needed. Disappointment, discontent, disorder and anarchy follow in swift sequence. If the citizenship of the country is not trained to loyalty, duty and obedience, government dissolves into social chaos, until restoration comes by a man on horseback. The heroic men and women who settled our country in its earlier history were trained to these disciplinary virtues by spiritual-minded parents who could make little claim indeed to scholarly accomplishment, but who knew the profounder lessons of life.

Such conditions and tendencies are by no means unknown to history. Greece had her similar experience and failed to respond to the warnings of Socrates and Plato. From the abundance of authorities upholding the fundamental virtues as of unrivaled importance, a few selections are given, and it is interesting to notice how accurately the language applies to our common sense thinking of to-day.

"There is education and education," as Plato once had occasion to remark. . . . . Education in this mean and narrow sense, the Greeks, with Plato, heartily despised. They set more store by the truer type which trains a man in all a man's qualities, setting him in pursuit of the high ideal of perfect citizenship and teaching him to rule and to obey.—Robinson: The Days of Alkibiades, p. 29.

Instruction, though it has power to direct and stimulate the generous among the young . . . . is as plainly powerless to turn the mass of men to nobility and goodness.—Aristotle. Davidson: Aristotle, p. 12.

The "old education" of Athens . . . . solved the problem that must be uppermost with every true educator . . . . viz., How can strong, wise and good men be produced?—Davidson: Aristotle, p. 62.

Every duty which tends to preserve human relations and human society must be assigned a higher place than any that stops short with knowledge and science.—Cicero. Davidson: Aristotle, p. 214.

To act considerately is of more moment than to think wisely.—Cicero. *Idem.*

Quintilian believed that in Education, moral influence and environment are even more important than mental stimulus. . . . . Material civilization without any accompanying moral discipline has produced the familiar and inevitable result. . . . . But moral and political improvement did not keep pace with an immense material and intellectual progress.—Dill: Roman Society, pp. 149, 369, 372.

PHYSICAL TRAINING

The importance of physical training is gaining recognition throughout the country, and the development will undoubtedly be stimulated by the war training our people are receiving. The poor physical showing made by the draft call should awaken our authorities to its urgent need.

We can hardly hope for systematic effort in the homes at present. But as children profit by physical training themselves, and in turn become parents, it is reasonable to believe that they will have more than passive solicitude for the health of their children and will be actively efficient in maintaining a healthy environment for the home. Moreover, they will be more interested and aggressive regarding building and sanitary legislation.

It is in our educational institutions where we will naturally look for the greatest improvement. Physical training was late in getting a foot-hold in our schools, where it is admitted to a small place in the program and receives a sort of stepchild's welcome. It is unfortunate that our public schools seem unable to pursue independent aims of their own, but must follow in flattering imitation the methods of the private colleges. Consequently, in athletics they must have their spectacular contests with picked teams. This leads to a concentration of interest on the part of a few, who often over-train and over-strain, and to the lack of good wholesome recreation on the part of the multitude. Pandemonium under the leadership of an emotional buffoon is no compensation.

The entire student body of the country should be under vigorous systematic training. Intercollegiate and interscholastic contests are desirable and no doubt there will always be specially prepared teams. A variation of the present method might prove of interest. When a match between two institutions is proposed, permit each institution to select out from its entire corps 20 per cent of its number. This would withdraw the crippled, the weak, and the general ineligibles. Let the contestants be then drawn by lot from the remaining 80 per cent. The teams made up in this way would be fairly representative of the general athletic condition and skill of their respective institutions. This method would furnish inducement for all to keep in training, and the result would be a better test of the comparative methods of the institutions than as at present.

It is freely acknowledged that it is easier to recognize faults than to find remedies; but the following suggestions are offered:

Up to 18 years of age there should be two periods per day of drill, exercise or play. This should be in the open air. A crowded gymnasium with poor ventilation is injurious.

In our public schools the periodical reports to parents should include the weight, height and chest expansion of each pupil. This would carry to the home live interest in the development of the children, and it also furnishes quick indication of constitutional illness.

Vocal training is a powerful factor in the promotion of health. Lungs, throat, and nasal passages are stimulated and made disease resisting. Posture is improved and deep breathing established. If the time now devoted to elocution, reading aloud and singing could be doubled, the advantages would far outweigh whatever seeming sacrifice it might involve.

Fresh air, sunshine, wholesome food and sound sleep are nature's immediate agents in the development of the young. It is natural and necessary for children to be physically active; it is unnatural and harmful that they keep seated in constrained posture for long periods. Physical activity until the body is thoroughly fatigued is the best inducer of sleep, and it matters little whether this takes the form of work, play, or varied exercises if it is not carried to the point of exhaustion. To seek the bed early because of bodily fatigue, with the mind undisturbed, is far more rational than the practice of school routines that keeps the body comparatively idle during the best hours of the day, while the brain is kept at high tension. If the body is yet physically energized while the mind is fagged, sleep at the best is unsatisfactory and nervous reactions are inevitable. The mind is "younger" than the body, in the sense that its development is later and slower. If, then, it is criminal to over-work children physically, it is fiendish to over-work them mentally. If the ancients ever fell into this error, the records are missing.

MORAL TRAINING

The expression "moral training" falls easily from the lips and flows smoothly from the pens of educators and uplifters. As indicating a purpose and a desirable result, its meaning is quite clear; but as descriptive of the process and means by which the

aim is to be reached, there is much evidence to believe that it carries diverse meanings and that its practice, as complementary to physical training, is almost a lost art.

The vagueness that attaches to the term may be charged partly at least to the word "moral" itself. In the minds of too many people moral training signifies instruction in a code of ethics, to be learned as one would learn a book lesson or memorize a set of adages and precepts, after which it is hoped that the appeal has been so convincing that the learner will make them the guide of his life. Either of the terms "character" training or "conduct" training would be less liable to this misconception. *Moral training* is such *training* as will develop good habits and good character and good social conduct in an individual. It is effective at all stages of life, but its influence is greatest during the years of adolescence. Conspicuous among the desired results are certain recognized virtues whose origin is beyond historic search and whose value as directive forces in human life is confirmed by each succeeding age. Among these we may mention truthfulness, honesty, obedience, loyalty, honor to parents, deference to age, respect for law, sense of duty, self-control, courage, patience and endurance. The possession or lack of such virtues in an individual is recognized by his open conduct. It is true that we cannot look into the hearts of men and discover motive and hypocrisy; but it is equally true that it is usually unjust to the subject and harmful to ourselves when we attempt to do so. In the long run, conduct is the expression of character and it is the most reliable of all tests. Character has direct relation to our habitual *actions*, to what we *do*. It may have but very little relation to our consciousness of what we *ought to do*. Conversely, it is known that character is largely the result of habit. Actions repeated merely as drill, or from any outside stimulus, impress mental patterns that operate involuntarily when the stimulus is suggested. The old saying that thoughts lead to deeds, deeds repeated make habits, and habits make character, asserts the same truth. But deeds, habits and actions of all kinds constitute *conduct*. Thus we find conduct and character complementary and mutually re-active upon each other. They are as closely unified as are the respective totalities of mind and body of which they are, in fact, but phases. Thus we may regard character as a state of mind, and conduct as the physical manifestation of this state. Or,

conduct may be conceived as a course of action, and character as the resulting impress on the mind.

This brings us to the point where we can see that *moral training* or *character training* is essentially a matter inseparable from *conduct*. The time-honored principle, "we learn by doing," has here its full application. There is nothing of mystery or of difficulty in the practice of moral training, and it is far more effective when applied to groups than to individuals. *Good habits are established and character is moulded by regulation and supervision of conduct.*

This is precisely the method used in all good military organizations, and its effectiveness in making over undisciplined, raw adults into worthy loyal citizens, filling positions of trust afloat and ashore, is convincingly shown by our naval records. The younger the recruit the more certain the benefit. The practice of obedience to rules and regulations, established for no other purpose than the common good of all, soon begets the habit of asking the questions, relative to any contemplated action, "Is it right or wrong?" "To do or not to do?" A mind habitually sensitive to these questions is under moral training. It is very doubtful if the graduates of our National Academies fully appreciate the value of the "Conduct Record" as the very foundation of their training. We may at times have felt the sting of injustice—for human devices are imperfect—but if there is any justification for the belief that no body of men have held the standard of honor and duty higher than ourselves, it is due to the training based on the democratic publicity of the conduct record, reinforced and vitalized in us by the example and precept of our worthy superiors.

Preliminary to a just appreciation of moral training is the necessity of comprehending the full and beneficent meaning of the word *obedience*. Unless this is done, the best instruction and practice may fail of response and even opposition may be engendered.

There is a very narrow conception of this word as it is applied to the relations between a cruel tyrant and his subject, a harsh master and his slave, or a severe parent and his child. In such cases we recognize a kind of obedience compelled by force. It is the obedience of subjection. Servitude would be a better term. Its results in extreme cases are degrading alike to both the parties affected. Even where the relations are more liberal, the word carries an unpleasant suggestion from the necessary punishments connected with disobedience.

On the other hand, obedience from the earliest times has been regarded as a basic virtue, and ethical writers and philosophers proclaim it as indispensable to human happiness and a moral or religious obligation among men. Church and state authorities are urgent that parents establish it as a habit in their children. It is the characteristic virtue of the soldier.

We do not have to look far for the reasons upon which such faith is founded. In the world of nature about us matter of all kinds yields obedience to gravitation. Because of this there is majestic harmony in the great sun systems of the universe, and we walk, operate and build on the surface of the earth with confidence and safety. No less true and beneficent is the obedience of atoms to the laws of chemical affinity. Conceive for the moment that all this uniformity is the result of an assumed volition and the disastrous consequences of disobedience are obvious. Thus in the material world we may think of obedience as the solvent that reduces chaos to order. In human affairs where mind is involved and volition is exercised, the conditions are analogous to those of the illustration. Where there is a law we have either obedience and order or disobedience and anarchy. But we are constantly under the influence of law and cannot escape its operation. As individuals we are subject to such obvious laws as those of gravitation and health. In obedience is safety, in disobedience, injury. In our social relations we find ourselves subject to laws so mysterious and fundamental that we ascribe them to a divine source, and in addition to these are rules unmistakably of our own discovery and application that cover the entire range of human conduct. The experience of the race is an unceasing lesson that in obedience to these laws lies the only path to order and happiness.

That obedience has ever been held in such high esteem may be better understood when we reflect that other eminent virtues and qualities are essentially of its substance. As examples, we may cite loyalty, honor to parents, respect for law, duty and self-control. These have significance only after they have passed from mere mental recognition to find expression in action; and the action that manifests the virtue is none other than obedience to some outward or inward appeal in behalf of right.

Obedience is thus seen to be the voluntary response in all our conduct to do right. It is "playing the game" whether the rules

always please us or not, whether we sometimes suffer or not. In a purely personal matter, right is determined solely by the voices from within; in social matters, others are also involved, and right is usually determined by the voice of experience in written or unwritten law.

There can be no government without obedience. Government implies two complementary parts, law-making and law observance. Whether in a monarchy or a democracy, if observance fails, law-making is futile and government does not exist. The crucial test of the strength of a democracy is simply this: Will 49 persons willingly do what they do not like when they have been outvoted by 51? The test of self-control in the individual is similar: Is he unfailingly obedient when he recognizes the majority voice within him? It may be said here that there is nothing more quickly and thoroughly destructive of character than the habit of doing things, seemingly unimportant, when we are conscious they are wrong. This is disobedience and it knows no degrees. Character is fortified by the opposite course which is obedience, and it never misleads. Therein is the imperative necessity of training children.

The attitude of the public toward the profession of arms reminds one forcibly of the attitude imputed to His Satanic Majesty regarding the order of monkhood. It is wholly a matter of his condition of health. When he is sick or in trouble, he embraces it; but when well, he abjures the whole business. In the piping times of prosperity military life is more or less discredited and false views and impressions are entertained regarding it. Among these errors none perhaps is more prevalent than the belief that obedience, discipline, duty, and other manifestations of the profession are maintained by the arbitrary power of supervision, backed by the right to enforce compliance through fear of punishment. The notion is too absurd to merit notice were it not for its persistence. The day is long past, if in fact it ever existed, when any body of men would submit to such conditions. A very little experience in the training of men develops the fundamental principle that the end sought is attained through encouragement, through appreciation of right endeavor, through rewarding the meritorious, and by organizing the best means to secure the greatest physical comfort and justice for all. There is no other possible way to secure obedience and loyalty in military life, or elsewhere. With few exceptions, men respond willingly to such treatment, as they

quickly realize the advantages of system, order and quick response to duty. If there is any better way to arrange the details of life and service, they know that the officers are as desirous of having it as they themselves, and are ready to adopt any reasonable suggestion. The habit of practicing these virtues brings its immediate reward in the common good enjoyed by all.

The youth of our country can be trained to these habits by precisely the same methods. In no way can a high standard of citizenship be more quickly reached than by such definite moral training in our public schools. In our large cities it is an urgent necessity, unless we have already hopelessly abandoned ourselves to an inevitable social deluge.

Children and youth from 12 years of age and upward should be subject to direct moral training for citizenship as the supreme consideration in our public schools. This period would cover what has come to be known as the Junior and Senior High schools. The essential step is to establish the Conduct Record as the chief feature of the pupil's career. The diploma should be a *Citizenship Diploma*, based on this record and reciting the fact that during the period of supervision and training the character of the pupil has been such as to justify the designated degree of merit, and because of this he is recommended to the state as worthy of trust and confidence and giving promise of loyalty in fulfilling the sacred obligations of citizenship. Deny this diploma, absolutely, to any one whose conduct, measured by the scale of merit, falls below the established standard. On every diploma inscribe the scholarship record of the pupil in the various branches, without comment. Any one who fails to receive the diploma should have a certificate of his scholarship record, if he desires it.

This would at once place the emphasis of school life where it belongs; worthy success would be within reach of all who will it; no change is required in the scholarship curriculum and scholarship would be improved by the better conditions and more serious tone of school life. There would be no special "problem" of discipline; all worthy incentives for scholarship excellence still remain, while the incentive for that which is indisputably better than scholarship is supplied. No pupil of good character and faithful effort is denied reward and discouraged for life by being pronounced a "failure" because of weakness in some branch of scholarship. When parents see that obedience, truthfulness, and

good conduct in general are the chief things demanded by the state, and that the diploma depends upon these things, there will be the hearty and effective co-operation by the home, now lacking. When the graduates of such training become parents in their turn, children will have better home training.

Furthermore, this is the only true foundation of military training. It requires no gun and no uniform. If our youth later are to receive the more specialized features of military drill with weapons, as is now advocated, the transition will be easy and the results prompt.

It is an error to regard youth between 12 and 18 years of age as *merely preparing* for life. Preparation for the future is involved, of course; but in a very obvious and real sense they are *actually in life,* cannot evade it, and have responsibilities and duties like their elders. It is their *duty* to be obedient, to respect established authority and to cultivate physical and intellectual industry. They should be held to these duties by the knowledge that failure characterizes them as unworthy, unsatisfactory and undesirable. These are the very penalties they will face later, and the lesson should be learned by the training and experience of the school. Words only, whether of persuasion, chiding or rebuke, are little better than idle breath. Deeds bring the quickest and best results.

It is likewise an error to let children or adults absorb the belief that our public schools are a mere benefaction—a kind of free gift from the plenitude of our resources—for the pleasure or profit of individuals. Such is far from the truth. They are established for the sole purpose of welding our people into loyal, unified effort in behalf of the nation itself. If by their operation we fail to secure loyalty to our institutions, respect for authority and obedience to law, they are unprofitable whatever else may be claimed in their behalf.

If we are to stand firm in the crucial days of the future, then necessity is the all-sufficient justification for this urgent appeal to improve the human element. No need of to-day is greater than that of loyalty and obedience in our citizenship, and this need may be greater still in the near to-morrow. Through neglect to steady our people by the corrective influence of wise training in these virtues, even the supreme benefits of popular government have been reduced to elements of weakness and dissolution.

Liberty is interpreted to mean license, and Freedom has become the privilege to flout law and authority. Minorities are impatient and non-compliant, and the spirit of sacrificial obligation has disappeared.

We need loyal officers for our fleets and ships, we need loyal crews to operate our guns and machinery. Promotion from the ranks will be more common in the future, and in emergencies officers will be made, as we witness to-day, by direct selection from the civilian body. These needs can be met only by a citizenship trained to loyalty and obedience in youth, and one that recognizes the obligation of duty to its government as prior to its demand for rights.

CONTENTMENT BASED ON JUSTICE

Of vital importance to any nation is the cementing of its units into the compactness of a brotherhood that recognizes by its laws and individual conduct the value of common interests above selfish ones. The attainment of this condition will be the realization of loyalty and patriotism, and the pathway is the moral training of the young. To this end we should bend every effort, however ideal may seem the goal. People seek their natural measure of happiness, and they must at least be content. As a body, the people of our country cannot complain because of lack of material things. The supply of food and clothing is ample. But contentment is of the mind no less than of the body. Discontent among the peoples of the world to-day is mental rather than material and results from a mixture of selfish desires, envy and a sense of injustice, ofttimes the result of a vicious propaganda. To the extent that real injustice is involved, it must be removed, for it cannot be cried down the wind. It is not sufficient in any country that justice should be confined to horizontal planes in the various strata of society. It must find expression vertically as well as horizontally and take fair measure of all the services that are interchanged between high and low. Discontent of a people often causes its government to seek relief from internal pressure by expansion against its competitors. The flame started by the Serbian match would probably have been already extinguished if the great nations of Europe had not been heated to the point of easy inflammability by a discontented and aggressive proletariat.

A nation, if it chooses, may permit its people for awhile to live the individualistic grab-bag life, each getting according to his physical and intellectual powers, not only what he can from natural supplies and resources, but from his neighbor as well, and converting the proceeds into a saturnalia of pleasure. But it cannot do these things as the expression of its normal life and then, suddenly, in the advent of war, live the fraternal, cohesive life of justice and common sacrifice that are the purchase price of victory. It cannot even continue to so live in the absence of all external enemies, for involved in such living are the very seeds of discontent and revolution.

Let us endeavor to compress thought of our subject into more compact area. We seek happiness and peace that come through ultimate victory in a continuous warfare against the destructive forces that encompass our lives. We recognize as the most violent and spectacular of our combats, armed international conflicts. We seek to avert these exactly as we seek to avert and avoid convulsions of nature, epidemics, and all other destructive agencies; but the wisest human devices can as yet give us no sure exemption from their devastation.

Man himself is the supreme factor in this warfare, and in his collective capacity as a nation he must maintain his household in order. Provision for supplies and resources must be so elastic as to embrace extreme needs; necessary communications must be controlled and his armies of workmen, professional men, scientists and teachers must be organized for the highest efficiency in the normal phases of the struggle. If not so organized and ready, no hurried improvisation will be adequate for the greater stress. National weapons must be of the keenest edge and superior power and skill must be developed to wield them.

In the ultimate, national power reduces almost wholly to human power, for by it other powers are controlled. Human power manifests itself as a composite of body and mind, and its development is responsive to good training. Health and character are the important aims in training. Childhood and youth cover the most productive period, but good results are not confined to these ages. Our nation is slack and inefficient in both these departments of training and responsibility for results should be placed upon the public schools. In the important issues of life, character is decisive, while scholarship and culture have but minor parts. Our

public schools, first of all, should be character factories rather than intellectual workshops.

Loyalty is incompatible with discontent. Men will not be denied justice. If discontent is ill-founded, justice disarms it; if it is well-founded, only justice will remove it.

We aim then at fundamental preparedness of material and manhood that fits the nation for its every-day tasks, whatever the day may bring forth, and fits us to be worthy co-laborers with other nations in the broad field of the world's work, doing our part and commanding their respect. On this strong platform we would mobilize our resources and concentrate our power for the sublime battle of national life: a battle that is unavoidable, incessant and, like the battle of life for the individual, must be waged against material and spiritual forces. There is no evil or vice that corrupts the heart of man that is not magnified in the heart of the nation. It is here that true preparedness begins, as has been so clearly stated by Admiral Knight in language that repetition cannot stale: "The preparedness of a nation begins deep down in the individual soul of the individual citizen . . . . it is essentially a consecration of self to a cause."

Prepared thus from the ground up for the entire field of conflict, we do not hesitate to accept war when righteousness must be bought for a price.

Such preparedness can be established only by consecrated men of clear vision and profound wisdom. While it is essentially the task of statesmen, the entire citizenship must contribute support and make unselfish sacrifice in its behalf. All are deeply interested, and none more so than those of the two services that constitute the arms of defence. It is they who are always on the scouting line and who respond to the first alarm. It is they who are in the van and first-line trenches when the storm breaks. It is they who make ultimate sacrifice at the call of duty, and whose highest ambition is the spiritual one of being themselves worthy of their noble traditions. They are entitled to the leadership and comradeship of men of the highest grade of physical and moral manhood, and they are entitled, above all, to a justified faith in the endurance and support of the government that sends them forth. Let us heed the tragic lessons of weak and faithless governments that have abandoned their armies to slaughter and starvation in the field, or have consumed them in serving the ambitions of rival leaders in revolutionary strife.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

THE NAVY AND FILIBUSTERING IN THE FIFTIES

By Louis N. Feipel

FOREWORD

The unsettled political condition of some of the Spanish-American countries has always been regarded by the United States Government with solicitude and regret on their own account, while it has been the source of continual embarrassment in our public and private relations with them. In the midst of the violent revolutions and the wars by which they have been almost continually agitated, their public authorities have been unable to afford due protection to foreigners and to foreign interests within their territories, or even to defend their own soil against individual aggressors, foreign or domestic. The resultant inconveniences and losses, therefore, have devolved in no inconsiderable degree upon the foreign states associated with them in close relations of geographical vicinity or of commercial intercourse.

Such has been, more emphatically, the situation of the United States with respect to Cuba, Mexico and Central America. Notwithstanding, however, the relative remoteness of the European states from America, facts of the same order have not failed to appear conspicuously in their intercourse with Spanish-American republics. Great Britain has repeatedly been constrained to resort to measures of force for the protection of British interests in those countries; and France found it necessary to attack the castle of San Juan de Ulloa, and even to debark troops at Vera Cruz, in order to obtain redress of wrongs done to Frenchmen in Mexico.

In line with this well-defined policy, the American Government has uniformly and steadily resisted all attempts of individuals in the United States to undertake armed aggression, or filibustering, against friendly Spanish-American states. To say that our laws

in this respect have sometimes been violated or successfully evaded, is only to say what is true of all laws in all countries, but not more so in the United States than in any one whatever of the countries of Europe. In short, the laws of the United States prohibiting all foreign military eslistments or expeditions within our territory would seem to have been executed with impartial good faith, and, so far as the nature of things permitted, as well in repression of private persons as of the official agents of other governments, both of Europe and America.

The story of the rise and progress of filibustering in the fifties has been told repeatedly. Mention must be made of Caldwell's "Lopez Expeditions to Cuba," Scroggs's "Filibusters and Financiers," Roche's "Story of the Filibusters" (republished under the title of "By-Ways of War"), Walker's "War in Nicaragua," Wells's "Walker's Expedition to Nicaragua," and Jamison's "With Walker in Nicaragua." One looks in vain, however, in those published annals—or, for that matter, in the published histories of the United States Navy—for any comprehensive account of the important and sensational part played by our naval forces in the suppression of filibustering during the sixth decade of the nineteenth century. And yet it is undeniable that but for the interference of the navy in the events attending those enterprises, the history of the regions affected would have taken a far different course from what it did. For the sailor-diplomat, as one historian has it, is pre-eminently a "shirt-sleeve" diplomat. He is a stranger to the devious and tortuous methods of procedure which so long disfigured international statecraft. Being a fighter by profession, he does not underestimate the importance of a display of concrete force when temporarily filling the peaceful office of a diplomat.[1]

For the preparation of an authoritative and intelligent account of the naval operations connected with filibustering, the author has had to have recourse to many original sources, many of them apparently hitherto unutilized by historians. For the general background of the story, however, he gratefully acknowledges his indebtedness to the sources and authorities mentioned above.

[1] Paullin's "Diplomatic Negotiations of American Naval Officers." That work, by the way, does not touch upon any of the events included in the present survey.

I. LOPEZ' FIRST EXPEDITION AGAINST CUBA

Filibustering, at least under that name, was unknown to the people of the United States until 1849. Early in August of that year, information was received at the State Department that an armed expedition, under the leadership of Narciso Lopez,[2] was about to be fitted out in the United States, with the intention of invading and liberating Cuba, and that certain persons were at that time engaged in enlisting and drilling soldiers at several points on our Atlantic coast, to be employed in this hostile enterprise, in violation of our laws and our conventional obligations. President Taylor, anxious to maintain the honor and peace of the country by the faithful discharge of his duties toward a friendly nation, accordingly directed Secretary of State Clayton to call the attention of the various district attorneys along the seaboard to this apprehended infraction of our laws. At the same time, the President issued the following proclamation:

11th August, 1849.[3]

BY THE PRESIDENT OF THE UNITED STATES.

A PROCLAMATION.

There is reason to believe that an armed expedition is about to be fitted out in the United States with an intention to invade the Island of Cuba, or some of the provinces of Mexico. The best information which the executive has been able to obtain, points to the Island of Cuba as the object of this expedition. It is the duty of this government to observe the faith of treaties, and to prevent any aggression by our citizens upon the territories of friendly nations. I have, therefore, thought it necessary and proper to issue this proclamation, to warn all citizens of the United States who shall connect themselves with an enterprise so grossly in violation of our laws and treaty obligations, that they will thereby subject themselves to the heavy penalties denounced against them by our Acts of Congress, and will forfeit their claim to the protection of their country. No such persons must expect the interference of this government in any form on their behalf, no matter to what extremities they may be reduced in consequence of their conduct. An enterprise to invade the territories of a friendly nation, set on foot and prosecuted within the limits of the

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[2] Lopez, a native of Venezuela, and an officer in the Spanish service, went to Cuba in 1843. In 1848, a conspiracy was formed in Cienfuegos and Trinidad, with the purpose of throwing off the Spanish yoke, but it was soon discovered and crushed. The principal leader in this movement was Lopez, who succeeded in making his escape to the United States.

[3] Senate Exec. Doc. No. 57, 31st Cong., 1st Sess.

United States, is in the highest degree criminal, as tending to endanger the peace and compromit the honor of this nation; and therefore I exhort all good citizens, as they regard our national reputation, as they respect their own laws and the laws of nations, as they value the blessings of peace and the welfare of their country, to discountenance and prevent, by all lawful means, any such enterprise; and I call upon every officer of this government, civil or military, to use all efforts in his power to arrest for trial and punishment every such offender against the laws providing for the performance of our sacred obligations to friendly powers.

Given under my hand, the eleventh day of August, in the year of our Lord one thousand eight hundred and forty-nine, and the seventy-fourth of the independence of the United States.

Z. TAYLOR.

By the President,
J. M. CLAYTON, *Secretary of State.*

Confidential orders had already, on August 9, been issued by the Secretary of the Navy, William Ballard Preston, to Commodore Foxhall A. Parker, commanding the home squadron, then stationed at Pensacola, Florida. These orders read as follows:

NAVY DEPARTMENT, August 9, 1849.[4]

SIR: Though the government has no precise information, yet it has been informed by communication from Brevet Major General Twiggs, "that 600 men raised in New Orleans landed on the 31st ulto. on Round Island, three miles from Pascagoula [Mississippi]; that they are unarmed, and encamped under their commander, Colonel White." General Twiggs was informed by Colonel White "that it was a party of emigrants destined to California." The general further states "that, large as was the body of men, he should have given the subject no consideration but for the popular belief that an expedition is being fitted out in the Southwest and West for the invasion of Cuba, or to revolutionize the Mexican States of the Sierra Madre." "Rumor here," the general remarks, "and in the city of New Orleans, points to this body of 600 men as a portion of the band to be employed, and which is to receive large reinforcements from the Western States." Other information, less authentic, has been furnished, in which it is alleged "that Colonel White is preparing an expedition against Cuba, that on the 28th ulto. he had raised 400 men in New Orleans, that he expected to raise in that city in all 800, and corresponding numbers in Boston, New York, and Baltimore, that the recruits at New Orleans are to be drilled at Cat Island, from which point they are to embark in the steamer *Fanny*, about the 20th or 25th instant, for the south side of Cuba, and that a considerable number of the military in Cuba are said to be in communication with them." "Colonel Briscoe, of New Orleans, and Charles C. Campbell are to be officers in the expedition," "that Whiting & Co., of New Orleans, have $250,000 to forward the expedition."

[4] *Ibid.*

Any such invasion of either Cuba or Mexico is a violation of our obligations of neutrality, as we are at peace with both governments.

The United States are bound to respect the rights both of Spain and of Mexico, and "no person is permitted, within the territory or jurisdiction of the United States, to begin or to set on foot or provide or prepare the means for any military expedition or enterprise to be carried on from thence against the territory of any foreign prince or state, or of any colony, district, or people, with which the United States are at peace."

You are therefore directed by the President to repair forthwith, with the force under your command, to the vicinity of Cat Island and the mouth of the Mississippi River, and co-operate with the district attorney of the United States and the collector of the customs at New Orleans, and act in concert with them, availing yourself of all such information and of all such means as they may have at their command, and vigilantly and actively observe the movements and operations of any bands or assemblages of people; for the purpose of ascertaining whether any hostile military expedition or enterprise is begun or set on foot, or any means provided, against the territory or dominions of any prince or state, or any colony, district, or people, with whom the United States are at peace.

Should you discover and ascertain any such attempt, by any portion of our citizens, to invade either Cuba or Mexico, you will employ the force under your command to prevent it.

If you should receive any information, or discover any fact, with regard to said movements, you will not only take prompt measures to arrest it, but you will give early notice to the Department.

Should you, on reaching Cat Island and its vicinity, ascertain that a hostile movement is on foot and has proceeded against the Island of Cuba, you will repair with the force under your command to that island, and use all proper means in your power by [? for] preventing their landing, so as to avert and prevent the violation of our obligations of amity and peace with Spain.

The duty assigned to you may become highly delicate and important. The Department relies upon your prudence, your sagacity, and your discretion for the successful accomplishment of the service to which you are ordered.

Very respectfully, yours, &c.,

WM. BALLARD PRESTON.

COMMODORE FOXHALL A. PARKER,
Commanding U. S. Home Squadron, Pensacola, Fla.

Similar orders were sent to Commander V. M. Randolph, of the sloop-of-war *Albany,* to Commander Charles Lowndes, of the sloop-of-war *Germantown,* to Lieutenant W. W. Hunter, commanding the steamer *Alleghany,* to Lieutenant George M. Totten, commanding the steamer *Water Witch,* and to Lieutenant Eben Farrand, commanding the schooner *Flirt.*

On the 18th of August, the *Albany* proceeded to sea, and arrived shortly afterwards off Pascagoula, Mississippi. There Commander Randolph learned that the force which was being collected on Round Island, 3 miles distant from Pascagoula, was to be embarked in the steamer *Fanny* and other conveyances some time during August, and would then proceed with all despatch to the point of destination—either Tampico, Mexico, or some place on the south side of Cuba—there to unite with the disaffected natives in bringing about a revolution—if in Cuba, adverse to the rights of Spain, and if in the Sierra Madre states, adverse to the rights of the republic of Mexico. In the absence of Commodore Parker, who had sailed north with the greater part of the home squadron before the instructions from Washington had reached him, Commander Randolph considered it his duty, as senior officer afloat in the Gulf of Mexico, to maintain, as far as he had the power, that peace and amity which at the time existed between the government and citizens of the United States and those of the two nations mentioned. According to instructions, therefore, he at once communicated with the collector of customs at New Orleans, Mr. Samuel J. Peters, and conferred with him in relation to the situation.

According to Peters, there were about 550 persons then assembled on Round Island, under the command of Colonel G. W. White, and their numbers were daily increasing by small squads of from 2 to 10 men. They were without arms, and undrilled, and they carefully avoided all acts which would brand them as a military expedition. They appeared to have been carefully selected, and were well dressed, though not in uniform. None of them, except the officers, knew what was their destination. Peters was, therefore, of the opinion (and in this opinion the district attorney concurred) that there was no violation of the laws of the United States against raising and fitting out military expeditions against a foreign country with which we were at peace. But that there was an intention to violate those laws, as well as our treaty obligations with Spain or Mexico, there could be very little doubt. Such an intention, Peters held, could easily be frustrated. It was unlikely that these men would be landed in a foreign country without arms and previous preparation. Therefore they must rely on receiving arms and ammunition at some

point, and probably intended landing and drilling somewhere. One or two armed government steamers could prevent the consummation of these designs; but sailing vessels, it was clear, could not be relied on for this duty. By a strict examination of any steamer or other vessels that might be employed to carry these people to their destination or intermediate place of rendezvous, sufficient evidence could probably be obtained to enable the government to frustrate the object of the contemplated expedition. The collector of the port of Mobile, John J. Walker, also held that the strict letter of the Neutrality Act of April 20, 1818, did not admit any power to detain a vessel clearing from the United States under the circumstances indicated. But at the same time, he held, that inasmuch as it was designed to prevent the violation of treaty obligations, and as he was satisfied that the object of this expedition was unlawful, a constructive power might be derived from the act to justify him in refusing a clearance to the vessel.

It was impossible for the *Albany* to approach nearer than 8 miles to Round Island with safety. This was regretted exceedingly by Commander Randolph, as he believed that the scaling of his guns and the explosion of a few shells from the Paixhans in view of the encampment of the expedition, would immediately send the men back to their homes, and thus break up the enterprise. As it was, he wrote to Captain John T. Newton, commandant of the navy yard at Pensacola, requesting him to despatch the steamers *Walker* and *General Taylor* to join the *Albany* off the southeast end of Horn Island. With these two steamers, and the *Water Witch,* which had already arrived, Randolph believed he could disperse the band of adventurers, who had now (August 23) congregated on Round Island to the number of 800. His plan was to give the *Fanny* and other conveyances a thorough search on their arrival, and in case he should find arms or other munitions of war on board, he would deem it his duty to detain them and prevent the embarkation of the men, which would, in all probability, defeat the enterprise at once.

While the *Albany* kept her position off the east end of Horn Island, the *Water Witch* was stationed close to Round Island. The boats of the *Albany* assisted in guarding the spot night and day, so as to prevent arms and ammunition from being landed on the island, and also to prevent the adventurers from being

taken from the island in sea-going vessels. On the 28th, Randolph sent a written summons to the adventurers to disperse immediately. This summons read as follows:

TO THE PERSONS ENCAMPED ON ROUND ISLAND, NEAR PASCAGOULA.[8]

Friends and Fellow Countrymen:

The proclamation of the President of the United States, and other instructions which I have received from the government at Washington, make it imperative and proper that I should immediately take measures to break up your unlawful assemblage, and send you back to your homes; and when I have said a few words to you in proof of your assemblage being unlawful, and of the utter impossibility of your evading the vigilance of our squadron and getting out of our waters to proceed upon your contemplated wild expedition to make war against nations at peace with our own, I feel sure you will at once disperse, and seek honest and peaceful occupations.

First. The very *mystery* which marks the movements and actions of your officers, and the blind ignorance of the men as to the destination of the enterprise, clearly show that the objects and purposes of those at the head of your affairs are known to be *unlawful,* and that plunder is the inducement held out to all who embark in this reckless expedition.

Second. We have proof that some of you have acknowledged that your destination was Cuba; and that others of your number have said that the expedition was fitting out for the invasion of the Sierra Madre States of Mexico; showing conclusively that your enterprise is one of a military character.

And *lastly.* You are *vagrants* in the eyes of the law, and in fact; and therefore cannot be allowed to occupy your present position, and must immediately disperse.

I will now prove to you that we have the means of not only preventing your embarkation to foreign parts, but that we can force you to abandon your present headquarters.

I shall employ all the vessels now in this vicinity, or which may hereafter arrive, in such manner as will most effectually bring about the ends desired.

First. I shall certainly prevent the steamers *Fanny, Maria Burt,* or any other steamer or steamers, vessel or vessels of whatever description, from furnishing the adventurers on Round Island with arms or other munitions of war.

Second. If said steamers or vessels have arms or other munitions of war on board, I shall take possession of said arms, etc., and detain said steamers or vessels until the men congregated on Round Island are dispersed.

Third. I shall prevent the band of men on Round Island from embarking on board of said steamers or vessels, or from having any communication with them at all.

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[8] Senate Exec. Doc. No. 57, 31st Cong., 1st Sess.

Fourth. I will make said steamers or vessels anchor within range of our guns.

Fifth. After to-day (28th August), in accordance with a notice before given them, I shall cut off all supplies of provisions which may be intended for the persons on Round Island, and shall rigidly enforce this blockade or embargo until they abandon the spot and go home.

Sixth. I shall gladly give the persons on Round Island every facility to get away; taking particular care, however, that they do not embark in *sea-going* vessels.

V. M. RANDOLPH,
Commanding U. S. Ship Albany, and Senior Officer Afloat in the Gulf of Mexico.

U. S. Ship *Albany*, off Pascagoula,
August 28, 1849.

But in Randolph's report, made the same day to Captain Newton at Pensacola, he spoke with considerable less assurance regarding his ability to disperse the expedition. He wrote:

I beg leave to reiterate my earnest request to have the *General Taylor*, and *Walker* too, if possible, despatched to this place. Should the *Fanny* and *Maria Burt* make their appearance off Round Island, I cannot answer for the consequences. Our present force is too small to keep the men on the island from being received on board, particularly should the two steamers come provided with arms, which is expected. Even the *General Taylor* alone would be of great service to us. Should you deem it impracticable to fit out the *Walker* for this service, could you not feel justified in chartering the *Creole* for a week or two, and sending her to us with two or more guns mounted from the navy yard, and to be manned and officered from the crew of this ship? I make this suggestion with all deference to your more mature judgment. Two or three field pieces and plenty of ammunition on board the *Creole* would make her an efficient vessel here. Sail vessels are of little use. We want a fast steamer or two, to give chase, should the *Fanny* and *Maria Burt* show themselves.[6]

Captain Newton accordingly despatched the *General Taylor*, under the command of John Pearson, master. Pearson was well acquainted with all the islands and shoals in the vicinity of Round Island, and could be of great service in piloting through the intricate passages. The *General Taylor* had a six-pounder field-piece mounted, with the proper ammunition, etc., as well as small arms for the crew. At the same time, Captain Newton expressed to Commander Randolph his doubts regarding the propriety of interfering to stop the adventurers, in case they were found to have passports, and had taken their passages on board of any vessel

[6] *Ibid.*

or vessels properly and regularly cleared out of our custom house, and with papers all correct, according to law. Newton also thought that Randolph had transcended his powers in issuing the summons to the Round Islanders. "It is a high prerogative, peculiar only to the President of the United States, Governors of States, and to Commanders-in-Chief of Squadrons when on *foreign service only.*"

The *General Taylor,* as also the schooner *Flirt,* arrived off Horn Island on the morning of the 29th, and the *Flirt* was at once despatched to join the *Water Witch* at Round Island. Randolph had, in the meantime, sent a copy of the summons to Collector Peters, at New Orleans, with the request that it be circulated in the city and up the Mississippi River. This request the collector declined to comply with, as he did not consider that the circumstances of the case sanctioned its issue. On the contrary, he entirely disapproved of it as being uncalled for and improper, adding that he and the district attorney were without any substantial and reliable proof which would sanction coercive action on the part of the government. The stringent measures of Commander Randolph were likewise denounced by the newspapers of New Orleans and Mobile.

By September 1, conditions appeared to Commander Randolph to be getting worse. His reports to the Navy Department contain passages like the following:

> The more I see of this band of reckless men, the stronger is my conviction that they are ready for any expedition which may be started, and that they are pledged to go wherever their leaders may direct. It is my deliberate opinion that if a *piratical* enterprise were, or could be, projected at this point to rob upon the high seas, that more than one-half of the 450 now assembled on Round Island would instantly volunteer to take part in it. They are a terror to this neighborhood, and I have been assured by a number of the citizens of Pascagoula that they have strong fears for the safety of their lives and property, particularly as our troops have been removed from this vicinity. The civil authorities are afraid to act, and in one instance have been defied.
>
> I have expected, and therefore am not surprised, to hear my stringent measures denounced by the newspapers of New Orleans and Mobile generally, and myself held up to derision, but this I do not regard, as I have seen for a length of time that the majority of newspapers of the two cities above named have been *strangely* silent on the subject of the *movement* which has been agitating these waters for the last six weeks. The irresistible inference to my mind is that the newspapers of New Orleans and Mobile have been paid to keep *silence.* And the same influences have caused them to ridicule and abuse the navy for using prompt and rigorous

measures to put down the lawless enterprise which *they* have studiously concealed from the people. The newspapers of New Orleans and Mobile were the last in the country to allude to the preparations which have been going on, for the last six weeks, to fit out an expedition against either Cuba, Mexico, or Yucatan; and even now they *feign* to make light of it—hence I care but little what they say of me: all that I am solicitous about is that the government will approve of what I have done. . . . .

There was a fight on the island last night, and two of the band were so badly stabbed that their lives are despaired of.[7] These are wretched doings, sir, in our waters, on an island only four miles from a fashionable watering-place, and where there are justices of the peace, a sheriff, and, not very far off, a circuit judge, all afraid to act! I sent the murderer on shore to be dealt with by the civil authorities of the sovereign "State of Mississippi," but could find no one willing to act. Either the people here (including the civil authorities) are sympathizers in the movement, or else are *afraid* to interfere.[8]

Nevertheless, on September 1, the expedition began to show signs of breaking up. On that day, one of the boats of the *Albany* returned from a trip to Round Island, bringing 12 of the adventurers, who were seafaring men, and who were anxious to ship into the naval service. They were good-looking men, and Randolph believed them to be Americans. He therefore determined to let them sign the articles.[9] Furthermore, a deputation from the band, in the persons of two of their officers, came to Randolph, and pledged themselves that they would accept transportation to New Orleans on the following day, provided Colonel White failed to send a steamboat before that time, and provided also that Randolph would feed them from his vessels in the meantime. To these terms Randolph readily agreed, and instructed Lieutenant Commander Farrand, of the *Flirt*, to convey on the morrow such of the men as were willing to disperse, either to New Orleans or Mobile, provided the number exceeded 50. When the time came, however, the adventurers declined to leave. It seems that Colonel White had arrived in Pascagoula, from New Orleans, and had prevailed upon them to play false to their agreement. Randolph had a talk with White, from which he gleaned that the adventurers still hoped to get to sea in the *Fanny*. He also learned that there was a plan maturing all over the West and Southwest to revolutionize Cuba.

[7] One of the men had died soon after being stabbed.

[8] *Ibid.*

[9] Eight other Round Islanders subsequently shipped on board the *Flirt* and *Water Witch*.

On September 4, the persons on Round Island renewed their application to Lieutenant Farrand for transportation to New Orleans. They stated that they had intended availing themselves of Randolph's offer the day before, but that they were opposed by many of the officers or persons who had control, and those who wished to go were therefore kept scattered. But during the night a large number of them had taken their blankets and encamped on the beach preparatory to embarking in the morning. Lieutenant Farrand sent his boats on shore and had all who wished to leave the island put on board the *Water Witch*. They numbered about 90 persons. They were despatched to New Orleans in the steamer *General Taylor* on the 5th of September.

On the 10th, the steamer *Alleghany*, Lieutenant W. W. Hunter, commanding, arrived from Pensacola. Lieutenant Hunter was at once sent by Randolph to New Orleans, for the purpose of obtaining more certain information regarding the plans of those who were directing the secret movements at Round Island, and also of endeavoring to ascertain positively if the steamer *Fanny* had been purchased by them and was still designed to take them upon the secret expedition. Hunter was a native of New Orleans, and was expected to bring back important intelligence.

Upon his arrival in New Orleans, Hunter learned from Mr. Peters, the collector of the port, and Mr. Bradford, acting district attorney, that in their opinion the energetic and prompt action of the government, together with the apparent want of funds at the disposition of the leaders, had so paralyzed the entire operations, as speedily to bring about a dispersion of the people assembled at Round Island. The steamer *Fanny* had already been purchased. One-half of the purchase price had been paid, but the leaders were unable to pay the remainder. Collector Peters held the register of the *Fanny*. Peters also declared that he could prove the connection between the parties concerned in the purchase of the *Fanny* and persons in New York implicated in similar illegal acts at that place. It was highly improbable, therefore, that any further effort would be made to send abroad the remnant of the band assembled at Round Island. Yet, in order to guard against the possibility of such an event, it was agreed that Collector Peters should give Randolph timely notice of any measures looking to the despatch of the *Fanny* or any other swift light-draft vessel.

At New York, on September 8, District Attorney J. Prescott Hall caused the *Sea Gull* and *New Orleans* to be detained by the naval forces of the United States, as being vessels engaged in the military expedition against Cuba. Hall called upon Captain Isaac McKeever, commandant of the navy yard at Brooklyn, for a force adequate to make the seizures. McKeever detailed four officers and 50 men for this service. With this force, the marshal of the district proceeded to the quarantine grounds in a steamer, took possession of the *Sea Gull* (a vessel of considerable size, having a propeller as auxiliary to her sails), brought her up to the navy yard, and placed her under the guns of the ship-of-the-line *North Carolina.* He then placed an officer with a small body of marines on board the *New Orleans* (a large sea-going steamer), which was lying at Corlears Hook, and detained her in the harbor. The *Florida,* another suspected vessel, was not seized, as she was in no respect ready for sea, and also because the district attorney thought the seizures already made would be sufficient to accomplish all of the government's purposes. These seizures effectually broke up all the plans of the filibusters. The President highly approved all of these prompt, energetic, and judicious actions.

Meanwhile, events occurring in Cuba itself were such as to induce a feeling of insecurity in the greater part of our countrymen in Havana. Several towns issued revolutionary pronunciamentos, a Spanish regiment had passed over to the pronunciados, and the breaking out of a civil war was imminent. The Spanish Government, at the same time, was despatching troops in all directions, and ordering the militia into active service. Commodore Parker, with the *Raritan* and *Saratoga,* of the home squadron, had touched at Havana about the middle of August, but had departed again before the situation became at all tense. The English consul at Havana deemed it prudent to request the British admiral in those waters to send a squadron to the place immediately; and our own consul, Robert B. Campbell, on August 28, followed this up by requesting Commander Randolph to send as large a force as possible to protect American interests. But the breaking up of the expedition at its sources in New Orleans and New York, as narrated above, obviated the necessity of exposing the officers and seamen of our navy to the diseases then prevailing in Havana.

In his reports to the Navy Department, Commander Randolph was careful to justify his conduct with sound reasoning, and suc-

ceeded thereby in gaining the undivided approval of all his actions by the department. His justification was couched in these words:

I was sent here [to Round Island], as I conceive, to defeat the machinations of a large body of reckless and abandoned adventurers; and after obtaining the opinions of those whose position and intelligence enabled them to know best the character of these people, and what they purposed doing, I determined to break up the expedition and disperse the band before transports should be sent to convey them beyond our reach. I saw, as I thought, but one way of doing this, and that one I have adopted. Had I waited until the *Fanny* arrived in these waters, and had I permitted that fast steamer to have communicated with the four or five hundred desperadoes on Round Island, and allowed her to receive them on board, I should indeed have been most blamable. But I warned Colonel White against bringing the *Fanny* within reach of our vessels, and I am well pleased that no attempt was made to anchor her off the island. When I inform you that we had no vessel in the gulf squadron which would stand the slightest chance of overtaking the steamer *Fanny*, you will not be surprised that I positively forbid her coming to Round Island. But I beg leave to make another statement. When I issued the summons to the people on Round Island, there was only this ship [the *Albany*] and the little steamer *Water Witch* at hand. The *Albany* cannot approach nearer than ten miles to Round Island, so that in fact the *Water Witch* and the *Albany's* boats were all we had to keep off the sea-steamers and to guard the island. The *Water Witch* is exceedingly dull, and rarely ever reaches six knots; and the steamer *Fanny* is a large and swift sea-going steamer, and runs at the rate of *twelve* knots the hour. What possible chance would there be for this ship [the *Albany*], anchored ten miles off, and the little dull *Water Witch* to prevent the *Fanny* from taking the men to sea and going to their place of destination, supposing I had allowed her to approach the island? And how should I have known *where* to give chase? I might have shaped my course for the south of Cuba, and in three days the *Fanny* might have landed the adventurers in Tampico! Or I might have made sail for Tampico, and in five days the *Fanny* might have landed the men on the south side of Cuba, or on the Island of Cozamel, east coast of Yucatan!

I must most respectfully beg leave to repeat—I was sent here, as I conceive, to maintain untarnished the honor of the nation, by using all proper means to keep the Round Islanders from leaving our waters to wage war against powers with whom we are at peace and amity. I *have* protected our country from this disgrace, and I cannot believe that you will blame me for what I have done. I had no other alternative: either their sea-going steamship *Fanny* must have been allowed to anchor off Round Island, and so take the adventurers off to sea, or else she was to be warned to keep away, and the adventurers starved out, and thus made to disperse. I have taken the latter alternative.[10]

[TO BE CONTINUED]

[10] Senate Exec. Doc. No. 57, 31st Cong., 1st Sess.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

DIVING AND THE DIVING SCHOOL

By LIEUTENANT COMMANDER E. W. STROTHER, U. S. Navy

There are three books on diving that cover the subject as completely as possible at the present stage of development of diving. These books are: "Diving Manual 1916," "Report on Diving Tests 1915," and a "Report of a committee on Deep Water Diving to the British Admiralty" published in 1907. The purpose of this article is not to try to cover the subject of deep water diving, but to bring to the attention of the service the fact that a diving school has been established at the torpedo station, to outline the work that the diving school is doing, and to touch on the most important parts of diving, which are all more thoroughly treated in the above-mentioned books.

The knowledge of diving, which includes the reasons why deep water diving is dangerous, the precautions which are necessary to take in deep water diving, and the remedy for the bends or caissons disease, has not been taught the commissioned personnel. The better an officer in charge of a diving party realizes the limitations of a diver, and in case of emergency what to do, the better it will be for the diver; fewer accidents will then occur, and more will be accomplished. After four years' experience as a torpedo officer, without any experience or training in diving, it is my belief that every torpedo officer should have at least a month's instruction at the diving school.

On November 1, 1915, by orders from the Navy Department, the diving school was established at the torpedo station with the inspector of ordnance as the inspector of diving. At the same time or shortly after, several gunners and chief gunners mates of diving experience were ordered to the torpedo station for duty in connection with the diving school. At that time the diving equipment for a school at the torpedo station was insufficient and there was no building adequately equipped. The winter months of the first year of the school's existence were therefore spent by the

diving school force in obtaining the diving equipment, remodeling the building which had been turned over to them, installing the equipment and fitting out the diving boats. In August, 1916, the first diving class started with 20 graduates of the seaman gunner class and three ship-fitters. The course of instruction is three months. The instruction given this first class was not as complete as the instruction given to the classes following. The diving school is still in the first stages of existence, and as time goes on the equipment will become more complete and the succeeding classes will receive the benefit of this equipment and of the greater experience of the diving instructors.

During the three months' course the class receives instruction in the diving tank under pressure, in diving in the bay, in manipulating air tools under water and in the smoke helmets. At the end of three months an examination is held on subjects covered during that period. The following are the requirements and qualifications for the different classes of divers.

1. The course of instruction is divided into eight subjects, each assigned a weight as follows:

Aptitude for diving	20
Diving and underwater seamanship	15
Diving apparatus	12
Salvage work	12
Underwater repair work	12
Diving formulæ	11
Decompression and recompression	10
Mine rescue apparatus	8
General average	100

2. Aptitude for diving will be understood as the aptness of a man for deep sea diving. Qualifications for first class diver are that he must qualify at the deep sea diving school, be physically apt and be able to stand a pressure without effects of vertigo and to be able to do work at depths of 250 feet or over. As a final mark of aptitude he must have at least 3.7 and a general average of not less than 3.5.

3. Second class divers must qualify at this school and be physically fit and be able to stand pressure up to 110 pounds without the effects of vertigo and to do work in depths up to 250 feet. As a final mark in aptitude he must have at least 3.5 and a general average of not less than 3.1.

4. Third class divers are graduates of the seaman gunners class who have qualified at 60 feet and men of the diving class who fail to qualify as first or second class and are able to do work up to 100 feet.

5. Men who are detailed for a course of instruction fitting them to qualify as diver, first class, should not be over 27 years of age; but once a diver has qualified first class he is to continue as such until he has been adjudged incompetent or has been found physically unfit. At the age of 35 he is to be automatically restricted from performing the duties of diver, first class, unless he is found to be physically qualified to dive over 250 feet, but he may continue as a second class diver, without the reduction of rating; at the age of 40 he is to be restricted to the depth of a diver, third class.

6. Men detailed for a course of instruction who are between the ages of 27 and 37 may qualify as diver first class only when in the opinion of the medical officer they are physically fit; otherwise they may qualify as second or third class divers. Men over 37 years of age may be detailed for a course of instruction to fit them as tenders and to take charge of divers.

7. Divers should requalify at least once every four years. Upon requalifying if a diver is found qualified to pass all the required tests, he may be qualified to a higher class diver. Such qualifying should be done at this school.

The diving school building is divided into two parts:

(1) The instruction and study room.

(2) The diving tank and recompression chamber room.

The first four weeks of the course are spent on inside work, and during this time the men are instructed in mathematics, formulæ for air supply to the divers, and formulæ for efficiencies of pumps; in diving in the diving tank; and in the construction of diving pumps.

The greater part of the remaining time is spent in actual diving in Narragansett Bay, the water varying from 25 feet to 168 feet. One hundred and sixty-eight feet is the greatest depth that can be found in Narragansett Bay. To dive to this depth it is necessary to wait until almost slack water. One diver is sent down at a time, and when that diver has returned to 10 feet from the surface another diver goes down. This deep part of Newport harbor is about 100 yards from Castle Hill Light. At this depth, on a bright day, a man can see from five to six feet around him; on an overcast, foggy day, a man standing alongside the descending

line can just see it. The bottom is better here than at any other part of the harbor in which diving has been done. The descending line weight is 200 pounds and even when the tide is almost slack this weight jumps off the bottom several inches.

The men also work with compressed air tools, cutting out rivets and sections of plating from a boiler sunk at the north end of the island.

The diving tank is a cylindrical steel shell made by the New York yard and tested to 210 pounds pressure. The only entrance is in the top of the tank through an air-tight manhole. Around the circumference of the tank near the bottom there are four glass ports through which a diver can be watched. The air hoses and telephone cables to the divers pass through the side of the tank near its top and are made air-tight. The interior of the tank is lighted. The purpose of the tank is to give the diver practice in controlling his air supply and exhaust valves, teach him how to equalize the pressure in his ears, expose him to pressures to which he will be exposed when diving to great depths, and at the same time have him under observation so that if anything goes wrong it will be immediately known and aid can be given.

Four divers can be put in the tank at once, but owing to the small space it is the habit to put only two in at a time. The pressure is raised in the tank by air applied on top of the water. This air pressure is controlled by a valve outside the tank, but each diver can shut off this pressure at will, since the air pipe passes down from the top of the tank almost to the bottom, then around about three-quarters of its circumference and thence to air outlet above the water level. In the air pipe near the bottom of the tank where it is horizontal and extending about three-quarters around the inside of the tank there are four stop valves, the closing of any one of which shuts off the air. The divers are dressed in the second floor of the diving school building and pass down the ladder through the manhole in the top of the tank. The ladder is hauled out, the trap door closed, and pressure almost immediately raised. As the pressure goes up, each diver stands by one of the stop valves, and if he experiences distress he can immediately shut off the air pressure by closing a stop valve. The sources of air supply, both for the divers and for the air pressure on top of the water, are the standard high pressure air accumulators. The air supply to each diver is entirely separate from the air supply which furnishes pressure to the tank.

The recompression chamber is a cylindrical shell lying in a horizontal position. There is a manhole at one end, and glass ports on the side. The tank is equipped with gauges, and air control valves on the outside and inside of the tank. It is used to recompress any man suffering from caissons disease.

The dangers of diving are:

1. A "squeeze" from a fall.
2. Insufficient air supply.
3. Caissons disease which may result in paralysis and death from too rapid decompression.

In diving in shallow depths up to 50 feet, practically the only danger is from a fall and "squeeze," the squeeze resulting from the fall. For example, if a diver were to fall from the surface of the water to 33 feet, the pressure on his body would be doubled, the air supply couldn't be given him fast enough, his head being in an incompressible helmet and his body being in the compressible suit, his body would be pressed up into his helmet causing instantaneous death. At greater depths a fall is not so dangerous, as the relative increase of pressure is not so great; for instance if a diver fell from 150 to 180 feet the corresponding increase in pressure would be approximately from 66 to 80 pounds or one-fifth increase. To prevent the fall, the diver should go down on his descending line, opening his exhaust valve half-way before entering the water, adjusting his air supply with one hand as he descends, and sliding down the descending line, using his legs and one arm. In this way he can stop his descent. The tenders in the boat also should carefully tend the life line and hose, and hold the diver in case he falls. In supplying air to the diver, the fundamental principle to remember is, that at whatever pressure a diver is under, he requires the same volume of air measured at that pressure; thus,

At 2 atmospheres or 33 feet the air supply must be double.
At 3 atmospheres or 66 feet the air supply must be treble.
At 4 atmospheres or 99 feet the air supply must be quadruple.
At 5 atmospheres or 132 feet the air supply must be quintuple.

AIR REQUIRED

Depth	Cu. ft. per minute
Surface	1.5
5½ fathoms	3.0
11 fathoms	4.5
16½ fathoms	6.0
22 fathoms	7.5

and so on. It has been found that the minimum air supply a man can breathe and work under is 1.5 cu. ft. of air per minute. Thus the fundamental formula of air supply is $S=1.5\ (1+F\ .0303)$ where S is the cu. ft. of air required, and F the depth in feet to which the dive is to be made. Because of the limited capacity of hand pumps 72 feet is the maximum depth to which a diver can go when one pump is used and still get the required air supply. However, two or three pumps can be connected to one manifold. According to a report of the British Admiralty, a diver went to a depth of 210 feet, being supplied with air by three pumps. The air supply was ample, but the pumping must have been hard work and required shifts of 18 men; it is believed that the compressed air system in use at the diving school is better. To find the number of revolutions required by a pump to deliver sufficient air to a certain depth, first find the efficiency of the pump, then use the following formula $\frac{100}{E}\ (F \times .194-C)=$ R. P. M.

E=efficiency

F=depth of dive in feet

C=constant number of R. P. M.'s required to deliver 1.5 cu. ft. at atmospheric pressure. This constant varies with different pumps and is obtained from the diving manual. The method of finding the efficiency is as follows:

T=Theoretical capacity in cu. in. per rev.

P=Test pressure in lbs. per sq. in. by gauge.

C=Capacity of test tank, air hose and air space in pump connections.

14.7=Pressure of 1 atmosphere.

R=Theoretical number of revolutions required to test tank to P.

X=Number of revolutions actually required to charge test tank to P.

$$1.\frac{14.7}{T}\overline{CP}=R.$$

$$100\frac{R}{X}=\text{per cent efficiency.}$$

When the dive is in excess of 72 feet two or more pumps are used. These pumps are connected to a manifold, from which

there is an outlet for one diver. Suppose three pumps, *A*, *B* and *C*, all of the same mark, are used, having as efficiencies E, $E_{,,}$ and $E_{,,,}$ the average efficiency being $\frac{E,\ E_{,,}\text{ and }E_{,,,}}{3}=E4$. Then obtain the revolutions for each pump by using the formula $\frac{100}{E4}$ $(F=\times.194+C)$.

Another method of getting the R. P. M.'s when the pumps are of different marks is as follows:

$S=1.5\times1728\ (1+F\ .0303)=$cu. in. of air required at the depth of diver$=Y$.

Having found the efficiencies of the pumps at the depth of the diver, the output of air in cu. in. at that depth is known. The sum of each pump's output of air is then obtained=total cu. in. output of air$=X$.

Then $\frac{Y}{X}=$rev. per minute for each pump.

In very shallow water two divers can be sent down receiving air from one pump, one diver to each cylinder and thus independent; but where two or more pumps are connected to a manifold never send more than one diver down receiving air from this manifold, since if the depth between the divers varies, the diver at the shallower depth will rob the other diver of his air.

The method of furnishing air to the divers at the torpedo station is the high pressure compressed air system. This consists of storing the air in reservoirs; for the diving school the air is stored in accumulators, for the work afloat, in torpedo air flasks in the diving boat. The advantages of this system over that of pumps, in the opinion of men of long diving experience, are very great. The use of the high pressure compressed air system for deep water diving is called for by the diving manual. This system undoubtedly is the best for all diving. It can be readily used on board a destroyer, the air reservoir being the torpedo air flasks on the deck of the destroyer and the diver going down direct from the destroyer. In the fleet there is the drawback that it will probably be impracticable to use torpedo air flasks in the diving boat.

The two great advantages of the use of high pressure air in diving are:

(1) A sufficient air supply to the diver or divers at all times.

(2) The diver controls his own air supply; when he wants more air he simply opens his air supply valves.

With these two major advantages are the minor ones of cooler air, small number of men required to man the diving pumps, and more room in the diving boat.

In using high pressure air for diving, the length of time that the supply will last should be known. The formula for obtaining this time and the problems illustrating are obtained direct from the diving manual.

C = Capacity of one air flask in cu. ft.

A = Atmospheres excess pressure in flask.

D = Number of divers.

E = Number of atmospheres excess pressure to which the dive is made.

Allowing 1 air flask atmosphere for charging testing tank, air hose and helmet to E; 4.5 cu. ft. to each diver per minute measured at absolute pressure or $E+1$ atmospheres; and reserve pressure of 220 lbs. per square inch or about 15 atmospheres to remain in the air flask in excess of that in which the divers are working, while on the bottom or E, the calculation of time of air supply is as follows:

$$\text{Time in minutes} = \frac{C(A-(15+E+1)}{4.5D(E+1)}$$

Example: One diver is to descend to 165 feet under water. How long will the air of one 11 cu. ft. air flask, charged to 2250 lbs. per square inch, last him?

$C = 11$

$A = \frac{2250}{14.7} = 153$

$E = \frac{165}{33} = 5$

$D = 1$

Then $11 \times \frac{(153-(15+5+1)}{4.5 \times 1(5+1)} = 53$ minutes.

With larger flasks or more flasks the time may be increased. It is also to be noted that the amount of air furnished the diver is 4.5 cu. ft. per minute, while the amount of air furnished by pumps is based on 1.5 cu. ft. per minute. The reason why 4.5 cu. ft. per minute is determined on is as follows:

.045=amount of CO^2 exhaled when doing moderate work.

$\frac{.045}{\text{Percentage of } CO^2 \text{ desired}}$ = No. cu. ft. per minute.

It has been found that not more than 3 per cent of an atmosphere of CO^2 should exist in the air that is to be breathed.

$\frac{.045}{.03}$ = 1.5 cu. ft. (pump) measured at absolute pressure of the diver.

It is better if there is only 1 per cent of CO^2 in the air.

$\frac{.045}{.01}$ = 4.5 (compressed air) measured at absolute working pressure of the diver.

In employing high pressure compressed air, it is necessary that the diver and his attendants be experienced in its use. If not there is danger of the diver being "blown up" or of bursting the air hose. By "blown up" is meant that so much air is given the diver that his exhaust valve is unable to exhaust the air fast enough, his suit becomes inflated and he rises rapidly to the surface; a dangerous accident when happening from a great depth. It is best to keep about 25 lbs. more pressure in the expansion chamber than the pressure to which the diver is exposed. This 25 lbs. excess pressure is needed for circulation of air. There is also the possibility of bursting the air hose, as the hose is tested out to 500 lbs. pressure only. For every foot the diver goes down, the pressure increases .445 lbs. If a diver were going down to 168 feet, pressure 75 lbs., as soon as the diver starts down I would put 90 lbs. pressure in the expansion chamber. The diver himself would control his air supply by his control valve. In case he should happen to fall, by opening his valve wide the danger from a "squeeze" would be entirely removed as the pressure would bank up his suit to counterbalance the water pressure. If the diver were going down to a depth of two hundred or more, I would put 75 lbs. in the expansion chamber as soon as he started down; when the marks in the air hose showed the diver to be about 130 feet, I would increase the pressure to that desired, *i. e.*, 25 lbs. in excess of the depth of the dive.

The greatest danger a diver incurs in deep water diving is the danger of too rapid decompression. The most comprehensive and detailed information on this subject that I have read is contained in a "Report of a Committee on Deep Water Diving," made

to the British Admiralty and published in 1907. I will merely touch on the principal facts brought out by the experiments carried on by that Committee. The cause of caissons disease is explained as follows: "When a gas is brought into contact with a liquid, the latter takes up the gas in simple solution, until a state of saturation is reached. The blood passing through the lungs is practically in contact with the air breathed, and therefore takes up, when a man or animal is in compressed air, an increased proportion of nitrogen and oxygen in simple solution, in accordance with Dalton's law. The increased proportion of nitrogen taken up by the blood in compressed air passes to the various semi-liquid tissues, which gradually also become saturated, since nitrogen, unlike oxygen, does not disappear by entering into chemical combination." Thus a diver becomes gradually saturated with nitrogen, depending upon the depth, the time at that depth and the amount of exertion while at that depth. Upon desaturation, bubbles of nitrogen form in the tissues and blood, and if the depth of the dive has been great and decompression rapid, the bubbles of nitrogen will form more rapidly than the blood can carry them to the lungs and thus cause a stoppage of the circulation and perhaps an aggravated case of caissons disease which will cause paralysis and possibly death. Here is an account of an aggravated case of caissons disease given in the British Admiralty's report referred to.

"M. D., P. O., 1st class, was employed diving for a torpedo in 24½ fathoms of water at Lamlash on November 28. He was a man of exceptionally good physique, not obese, and perfectly healthy. A warrant officer was in charge of the diving party, and owing to the great depth of water, took particular notice of the time. He states the man took 40 minutes to reach the bottom, that he remained there 40 minutes, and took 20 minutes to come up. This latter he did himself slowly and steadily without hurry, the men in the boat only taking in the slack of the rope. He climbed up the ladder on the boat's side himself, and, on the face-plate of the helmet being removed, said he felt all right; he then came into the boat with the ordinary assistance to be undressed. When the helmet was taken off, he answered a number of questions about his work, and gave a most detailed account of the same. He also joked with the other men, who all

say they never saw him, or anyone else, come up in better condition. He felt perfectly well all the time he was in the water, suffered no inconvenience whatever, and only came up because it was so dark in the depth he was in that he could find nothing. He was cheerful and sensible, and had absolutely no symptoms whatever of anything wrong till some 8 or 9 minutes had elapsed from the time of his leaving the water. He then suddenly complained of pain in the stomach, and asked them to be quick and get off his dress, as he wished to get on board. In a second or two after he said, 'Send for the doctor,' and immediately slid down in the boat quite limp and unconscious. Fleet-Surgeon McKinley saw him at once, and found him in a comatose state. His skin cyanosed and his breathing was stertorous, labored, and difficult. His lips were blowing and covered with froth. He was taken out of the dress and carried to the sick bay, but death took place before he got there; viz., about 15 minutes after reaching the surface, and 6-7 from the first symptoms of illness. He had no vomiting, convulsions, or spasm of muscles at any time."

It has been found that if the depth of the dive does not exceed 45 feet, there is little danger from rapid decompression and the period of decompression from depths down to 90 feet is very small.

A diver can be safely brought from a depth having a certain pressure to another depth having a lesser pressure when the ratio of the two absolute pressures is 2.3 : 1. The example herewith given is taken from the diving manual.

"A diver working at a depth of 165 feet under water, or 5 atmospheres excess pressure, or 6 atmospheres absolute. According to the theory, absolute pressure could be diminished to 2.6 atmospheres; *i. e.*, 6 : 2.6 :: 2.3 : 1. As we have the atmosphere exerting 1 atmosphere pressure, the diver can be safely brought up to an excess pressure of 1.6 atmospheres, a depth from the surface of 53 feet, the diver coming quickly from deep, dangerous pressure to a comparatively shallow depth, and with various additional stops, at every 10 feet, to the surface. The time at each stop must be such that the proportion of the relative pressure of the nitrogen in solution in the body and the combined pressure of all the gases in the aveoli (total absolute air pressure) shall never be greater than 2.3 : 1."

Deep sea diving requires a quick descent, short stay at the high pressure on the bottom, and quick ascent most of the way up,

TABLE I.—DECOMPRESSION

STOPPAGES DURING THE ASCENT OF A DIVER AFTER ORDINARY LIMITS OF TIME FROM SURFACE.

Depth		Pressure in pounds per square inch	Time from surface to beginning of ascent	Approximate time to first stop	Stoppages in minutes at different depths						Total time for ascent in minutes
Feet	Fath.				60 ft.	50 ft.	40 ft.	30 ft.	20 ft.	10 ft.	
0-36	0-6	0-16	No limit	....	.....	.....	.....	.....	.....	.....	0-1
36-42	6-7	16-18½	Over 3 hrs.	1	.....	.....	.....	.....	.....	5	6
42-48	7-8	18½-21	Up to 1 hr.	....	.....	.....	.....	.....	.....	.....	1
			1 to 3 hrs.	1½	.....	.....	.....	.....	.....	5	6½
			Over 3 hrs.	1½	.....	.....	.....	.....	.....	10	11½
48-54	8-9	21-24	Up to ½ hr.	....	.....	.....	.....	.....	.....	.....	1
			½ to 1½ hrs.	2	.....	.....	.....	.....	.....	5	7
			1½ to 3 hrs.	2	.....	.....	.....	.....	.....	10	12
			Over 3 hrs.	2	.....	.....	.....	.....	.....	20	22
54-60	9-10	24-26½	Up to 20 min.	....	.....	.....	.....	.....	.....	.....	1
			20 to 45 min.	2	.....	.....	.....	.....	.....	5	7
			½ to 1½ hrs.	2	.....	.....	.....	.....	.....	10	12
			1½ to 3 hrs.	2	.....	.....	.....	.....	5	15	22
			Over 3 hrs.	2	.....	.....	.....	.....	10	20	32
60-66	10-11	26½-29½	Up to ½ hr.	2	.....	.....	.....	.....	.....	.....	1
			½ to 1 hr.	2	.....	.....	.....	.....	.....	5	7
			1 to 2 hrs.	2	.....	.....	.....	.....	3	10	15
			2 to 3 hrs.	2	.....	.....	.....	.....	5	15	22
			Over 3 hrs.	2	.....	.....	.....	.....	10	20	32
66-72	11-12	29½-32	Up to ½ hr.	2	.....	.....	.....	.....	.....	2	14
			½ to 1 hr.	2	.....	.....	.....	.....	3	5	10
			1 to 2 hrs.	2	.....	.....	.....	.....	5	12	19
			2 to 3 hrs.	2	.....	.....	.....	.....	10	20	32
72-78	12-13	32-34½	Up to 20 min.	2	.....	.....	.....	.....	.....	5	7
			20 to 45 min.	2	.....	.....	.....	.....	5	10	17
			½ to 1½ hrs.	2	.....	.....	.....	.....	10	20	32
78-84	13-14	34½-37	Up to 20 min.	2	.....	.....	.....	.....	.....	5	7
			20 to 45 min.	2	.....	.....	.....	.....	5	15	22
			½ to 1½ hrs.	2	.....	.....	.....	.....	10	20	32
84-90	14-15	37-40	Up to 10 min.	2	.....	.....	.....	.....	.....	3	5
			10 to 20 min.	2	.....	.....	.....	.....	3	5	10
			20 to 40 min.	2	.....	.....	.....	.....	5	15	22
			40 to 60 min.	2	.....	.....	.....	3	10	15	30
90-96	15-16	40-42½	Up to 10 min.	3	.....	.....	.....	.....	.....	3	5
			10 to 20 min.	3	.....	.....	.....	.....	3	5	10
			20 to 35 min.	2	.....	.....	.....	.....	5	15	22
			35 to 55 min.	2	.....	.....	.....	3	10	15	30
96-108	16-18	42½-48	Up to 15 min.	3	.....	.....	.....	.....	3	5	11
			15 to 30 min.	3	.....	.....	.....	3	7	10	23
			30 to 40 min.	3	.....	.....	.....	5	10	15	33
108-120	18-20	48-53½	Up to 15 min.	3	.....	.....	.....	2	3	7	15
			15 to 25 min.	3	.....	.....	.....	5	5	10	23
			25 to 35 min.	3	.....	.....	.....	5	10	15	33
120-132	20-22	53½-59	Up to 15 min.	3	.....	.....	.....	2	5	7	17
			15 to 30 min.	3	.....	.....	.....	5	10	15	33
132-144	22-24	59-64½	Up to 12 min.	3	.....	.....	.....	3	5	5	16
			12 to 25 min.	3	.....	.....	2	5	10	12	32
144-156	24-26	64½-70	Up to 10 min.	3	.....	.....	.....	3	5	5	16
			10 to 20 min.	3	.....	.....	2	5	10	12	32
156-168	26-28	70-75	Up to 10 min.	3	.....	.....	2	3	5	5	18
			10 to 16 min.	3	.....	2	3	5	7	10	30
168-180	28-30	75-80½	Up to 9 min.	3	.....	.....	2	3	5	5	18
			9 to 14 min.	3	.....	2	3	5	7	10	30
180-192	30-32	80½-86	Up to 13 min.	3	.....	2	3	5	7	10	30
192-204	32-34	86-91½	Up to 12 min.	3	2	2	3	5	7	10	32

TABLE II.—DECOMPRESSION

STOPPAGES DURING THE ASCENT OF A DIVER AFTER DELAY BEYOND THE ORDINARY LIMITS OF TIME FROM SURFACE.

Depth		Pressure in pounds per square inch	Time from surface to beginning of ascent	Approximate time to first stop	Stoppages in minutes at different depths								Total time for ascent in minutes
Feet	Fath.				80 ft.	70 ft.	60 ft.	50 ft.	40 ft.	30 ft.	20 ft.	10 ft.	
60–66	10–11	26½–29½	Over 3 hrs.	2	.....	.....	.....	.....	.....	.....	10	30	42
66–72	11–12	29½–32	2 to 3 hrs.	2	.....	.....	.....	.....	.....	.....	10	30	42
			Over 3 hrs.	2	.....	.....	.....	.....	.....	.....	20	30	52
72–78	12–13	32–34½	1½ to 2½ hrs.	2	.....	.....	.....	.....	.....	.....	20	25	47
			Over 2½ hrs.	2	.....	.....	.....	.....	.....	.....	30	30	62
			1½ to 2 hrs.	2	.....	.....	.....	.....	.....	.....	15	30	47
78–84	13–14	34½–37	2 to 3 hrs.	2	.....	.....	.....	.....	.....	5	30	30	67
			Over 3 hrs.	2	.....	.....	.....	.....	.....	10	30	35	77
			1 to 1½ hrs.	2	.....	.....	.....	.....	.....	5	15	25	47
84–90	14–15	37–40	1½ to 2½ hrs.	2	.....	.....	.....	.....	.....	5	30	35	72
			Over 2½ hrs.	2	.....	.....	.....	.....	.....	20	35	35	92
			1 to 1½ hrs.	2	.....	.....	.....	.....	.....	5	15	30	52
90–96	15–16	40–42½	1½ to 2½ hrs.	2	.....	.....	.....	.....	.....	10	30	35	77
			Over 2½ hrs.	2	.....	.....	.....	.....	.....	30	35	35	102
			40 to 50 min.	2	.....	.....	.....	.....	.....	10	15	20	47
96–108	16–18	42½–48	1 to 2 hrs.	2	.....	.....	.....	.....	5	15	25	35	82
			Over 2 hrs.	2	.....	.....	.....	.....	15	30	35	40	122
			35 to 60 min.	2	.....	.....	.....	.....	5	10	15	25	57
108–120	18–20	48–53½	1 to 2 hrs.	2	.....	.....	.....	.....	10	20	30	35	97
			Over 2 hrs.	2	.....	.....	.....	.....	30	35	35	40	142
			½ to ¾ hrs.	3	.....	.....	.....	.....	5	10	15	20	53
120–132	20–22	53½–59	¾ to 1½ hrs.	3	.....	.....	.....	5	10	20	30	30	98
			Over 1½ hrs.	3	.....	.....	.....	15	30	35	40	40	163
			25 to 45 min.	3	.....	.....	.....	3	5	10	15	25	61
132–144	22–24	59–64½	¾ to 1½ hrs.	3	.....	.....	.....	10	10	20	30	35	108
			Over 1½ hrs.	3	.....	.....	.....	30	30	35	40	40	178
			20 to 35 min.	3	.....	.....	.....	3	5	10	15	20	56
144–156	24–26	64½–70	35 to 60 min.	3	.....	.....	.....	7	10	15	30	30	95
			Over 1 hr.	3	.....	.....	20	25	30	35	40	40	193
			16 to 30 min.	3	.....	.....	.....	3	5	10	15	20	56
156–168	26–28	70–75	½ to 1 hr.	3	.....	.....	3	10	10	15	30	30	101
			Over 1 hr.	3	.....	5	25	25	30	35	40	40	203
			14 to 20 min.	3	.....	.....	.....	3	3	7	10	15	41
168–182	28–30	75–80½	20 to 30 min.	3	.....	.....	2	2	3	10	15	25	60
			½ to 1 hr.	3	.....	3	3	7	10	20	30	35	111
			Over 1 hr.	3	.....	15	25	30	30	35	40	40	218
			13 to 20 min.	3	.....	.....	.....	3	3	7	15	15	46
182–194	30–32	80½–86	20 to 30 min.	3	.....	.....	3	3	5	10	15	25	64
			½ to 1 hr.	3	.....	3	5	10	12	20	30	35	118
			Over 1 hr.	3	5	20	25	30	30	35	40	40	228
			12 to 20 min.	3	.....	.....	3	3	5	7	10	20	51
194–206	32–34	86–91½	20 to 30 min.	3	.....	3	3	3	5	10	20	20	67
			½ to 1 hr.	3	3	3	5	10	15	20	30	35	124
			Over 1 hr.	3	15	20	25	30	30	35	40	40	238

then stage decompression; *i. e.*, a short stay at each of the different depths, as shown in the decompression tables.

The depth to which a diver may go is limited by the fact that oxygen under pressure becomes a poison when breathed. The real danger due to oxygen pressure is at about 10 atmospheres pressure absolute or 297 feet, for appreciable periods. This increases with the depth, and at 15 atmospheres pressure absolute, even the shortest stay would be very dangerous.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

ENGINEERING STUDY DIRECTORY FOR NAVAL OFFICERS UNDER TRAINING

By LIEUTENANT COMMANDER R. R. SMITH, U. S. Navy

The great expansion which has taken place in the navy since the commencement of the war has resulted in the commissioning of many new officers.

The number of officers received from the naval militia was not sufficient to supply the demand for officers and the department was obliged to look elsewhere for the number required. Officers of the naval reserve who signified their willingness to accept general service, and who were recommended by their commanding officers, have been assigned to duty afloat on practically all classes of vessels. Some of these officers were fortunate enough to be sent to the Naval Academy for a three months' course of instruction, and while there, received the advantages of contact with the naval customs and traditions which play so great a part in the formation of naval character. It is unfortunate that they should not have had more time at the Academy, but the urgency of their need for the service did not permit it. Other classes will receive the same course, but a great number of reserve officers going to various ships have not been and cannot be sent to the Naval Academy.

It cannot be expected that these officers will at once be available to perform duties which, in ordinary times, require several years to learn. Nor can it be expected that they will bring with them the same spirit and morale with which the Naval Academy graduate has been indoctrinated.

It becomes incumbent, therefore, upon those in the regular establishment to take these officers in hand and direct their studies to the more important subjects which they should know. If they are to make rapid progress it is necessary that their studies be

supervised, otherwise the subjects will not be covered to the best advantage; too much time will be put on some subjects, and too little on others.

Some reserve officers have been assigned to engineering duties exclusively. They are in most cases technical graduates. Very few have had marine experience; practically none have had experience with naval machinery.

The following schedule of study was prepared for use on the *Alabama* and applies more accurately to the simpler installations of the older ships than to turbine driven or oil burning ships. These subjects have been included in a general way, but the student who covers the course outlined should be able to seek his own information on the newer installations. A minimum of 10 hours of study a week, in addition to watch standing, has been required, but the weekly reports submitted by the officers under instruction have shown from 20 to 30 hours a week.

The success of the course lies wholly in the actual operation of machinery by the student, and his constant attendance when repairs are underway. One four-hour watch in the evaporator room, starting up, blowing down and shifting combinations, is better than the same time spent on the references, although the study is necessary. The knowledge gained by operating the machinery is retained longer than the information obtained from books. It also clarifies many difficult points.

After several weeks watch standing, the student, under the supervision of the watch officer, is required to take charge of the watch. The latter is always on hand to give advice and take charge if necessary, but he should refrain from giving orders unless absolutely necessary and then only through the student.

The amount of time required to train a new officer to take a watch is dependent upon the officer's ability, education and industry, and the amount of supervision and help which the engineer officer can give him.

It is hoped that the following study directory will be found useful by officers under engineering training and by those charged with their instruction:

ENGINEER COURSE FOR OFFICERS UNDER TRAINING

(1) INSTALLATION, (2) EVOLUTIONS, (3) ROUTINE UPKEEP, (4) STORES AND RECORDS, (5) ELECTRICAL

PART 1.—INSTALLATION

Subject	Reference for study	Operation	Repairs and upkeep
1. Steam and exhaust lines, both main and auxiliary, from boilers to condensers, including valves, traps and fittings on lines. Line sketches.	Ship's blue prints. Naval Machinery—Barton & Stickney. Practical Marine Engines—Durand.	Watch duty. Warming up lines, securing lines, draining lines, cross-connecting lines.	Repacking slip joints. Remaking leaky joints. Repairing leaks. Relagging.
2. Feed lines, main and auxiliary, from condensers to boilers, including valves, fittings, heaters, suctions, stowage of feed water and feed pumps. Line sketches.	Ship's blue prints. Naval Machinery—Barton & Stickney. Practical Marine Engines—Durand. Bu. S. E. pamphlet on boilers. Bu. S. E. pamphlet on pumps. Navy Regulations.	Watch duty. Starting and securing a feed pump. Regulating pressure. Operation of feed water heater. Shifting suctions. Taking make-up feed. Shifting feed pumps. Operating stops and checks at boiler.	Repacking feed pump. Repairing leak in feed heater. Grinding in checks and stops. Remaking joints.
3. Main engines, principle of construction, steam passages, jacket valves, relief valves, material of parts, pistons, rods and bearings, jacking and reversing engines.	Ship's blue prints. Naval Machinery—Barton & Stickney. Practical Marine Engines—Durand. Bu. S. E. pamphlet "Instructions." U. S. Navy Regulations.	Watch duty. Starting, stopping and reversing. Jacking engines in port. Setting cut-offs. Use of drains. Oiling. Warming up. Securing duties of an oiler. Taking indicator cards.	Cooling a bearing. Overhauling crosshead brasses. Overhauling crank pin brasses. Overhauling eccentric gibs and main bearings. Examination of cylinders and valves in port. Repacking throttle.
4. Condensers, main and auxiliary; construction and operation. Circulating and air pumps.	Ship's blue prints. Naval Machinery—Barton & Stickney. Practical Marine Engine—Durand. Bu. S. E. pamphlets "Instructions." U. S. Navy Regulations.	Starting up and securing. Regulation of vacuum. Regulation of circulation water. Stopping of air pump or circulator. (See casualty bill).	Testing. Repairing leaks. Renewing zincs. Renewing air pump valves.
5. Feed tanks and fittings. Location of drains to feed tanks.	Ship's blue prints. Naval Machinery—Barton & Stickney. Practical Marine Engines—Durand. Bu. S. E. pamphlet "Instructions." U. S. Navy Regulations.	Water level. Taking extra feed. Cross connecting. Overflowing. Running back.	Renewal of loofa sponges. Cleaning.
6. Pumps and manifolds. Construction and uses. Connections.	Bu. S. E. pamphlet on Pumps. Ship's blue prints. Naval Boilers—Lyons & Hinds. Practical Marine Engines—Durand.	Starting and stopping. Taking a suction and discharge. Regulation of pressures and check valves. Oiling.	Repacking stems and stuffing boxes. Renewal of disc valves. Setting of valve cut-offs.

ENGINEER COURSE FOR OFFICERS UNDER TRAINING—CONTINUED

PART 1.—INSTALLATION—CONTINUED

Subject	Reference for study	Operation	Repairs and upkeep
7. Boilers, scotch, construction of shell, tubesheets, dry pipe, tubes, furnaces, safety valves, stop valves, water columns and other fittings. Material of each.	Bu. S. E. pamphlet on boilers. Naval Boilers—Lyons & Hinds. Practical Marine Engines—Durand. Ship's blue prints.	Duties of a water tender in detail. Duties of a fireman in detail.	Renewal of grate bars. Replacing broken gauge glasses. Blowing tubes, stopping leaks.
8. Boilers, Babcock & Wilcox, headers, tubes, furnaces, drums, hand plates, baffles, mud boxes, side doors, etc.	Bu. S. E. pamphlet on boilers. Naval Boilers—Lyons & Hinds. Bu. S. E. pamphlet on oil burning. Practical Marine Engines—Durand.	Duties of a water tender in detail. Duties of a fireman in detail.	Not installed.
9. Prevention of corrosion.	Bu. S. E. pamphlet on boilers. Bu. S. E. pamphlet on Water Test. U. S. Navy Regulations. Naval Boilers—Lyons & Hinds.	Testing water daily. Putting compound in the feed water. Using surface and bottom blows. Using of test steel pieces.	See routine upkeep on boilers.
10. Hull drainage—locations and suctions of main drains and secondary drains. Pump connections to main drains. Pump and manifold connections to secondary drains. Fittings, line sketches.	Ship's blue prints. Naval Construction.	Taking a suction on a given compartment. Emptying strainers.	Leaks in lines. Renewal of worn valve stems. Leaky flanges.
11. Evaporators, construction, material of parts, principles of operation, pressures, combinations, leaks to tanks. Distillers, feed heaters and feed pumps for evaporator. Line sketches.	Bu. S. E. pamphlet on evaporators. U. S. Navy Regulations. Bu. S. E. pamphlet "Instructions" (re to care of machinery).	Watch on evaporating plant. Starting up, blowing down, testing water. Prevention of priming. Shifting combinations. Stopping. Shifting bottoms.	Sealing. Renewing zincs. Opening evaporators. Closing up.
12. Flushing system and fire mains.	U. S. Navy Regulations. Naval Construction—Robinson. Ship's blue prints.	Putting pressures on fire mains. Regulation of pressure. Trace leads of both systems.	Regrinding valves, renewing zincs. Renewal of valve stems.
13. Ice machines and ice boxes.	Bu. S. E. pamphlet on Ice Machines. U. S. Navy Regulations.	Watch on ice machines. Oiling, starting, stopping, blowing down, shifting air to ice boxes. Make ice. Loss of pressure.	Repacking of leathers. Grinding of leaky valves. Reseating of valves.

ENGINEER COURSE FOR OFFICERS UNDER TRAINING—CONTINUED

ENGINEER COURSE FOR OFFICERS UNDER TRAINING—CONTINUED

PART 1.—INSTALLATION—CONTINUED

Subject	Reference for study	Operation	Repairs and upkeep
14. Steering engine—differential valve gear, shafting, clutches, wheel ropes. Telemotor control.	Naval Machinery—Barton & Stickney. U. S. Navy Regulations.	Starting, securing, operating from engine.	Setting of limits of valves. Breaks. Oiling, repacking.
15. Ash hoists—follow up gear on valve control.	Naval Machinery—Barton & Stickney. U. S. Navy Regulations.	Hoisting and lowering.	Renewal of cables. Repacking of glands.
16. Winches, cranes, anchor engine, air compressors, principles of same, clutches, etc.	Naval Machinery—Barton & Stickney. U. S. Navy Regulations.	Actual operation of same.	Repacking leads. Repairing breaks.
17. Steam launches—boilers, pumps, engines, feed heaters, condensers and air pumps.	Naval Boilers—Lyons & Hinds. Naval Machinery—Barton & Stickney. U. S. Navy Regulations. Bu. S. E. pamphlet on boilers.	Firing and tending water; starting, stopping and backing of engines. Routine cleaning of fires, tubes and blowing. Preparations for lighting off, hoisting out, banking, handling fires, hoisting in.	Daily inspection. Renewal of grate bars. Renewal of leaky tubes. Repacking pipes and fittings. Renewal of engine parts. Refitting of bearings, piston rings, etc. Repairing leak in condenser.
18. Marine Gas Engines—principles of parts and construction. Faults and remedies. Loss of compression, misfires, cooling, fuel supply, firing devices, oiling system.	Internal Combustion Engines (USNR) Bu. S. E. pamphlet on Norfolk Engines.	Priming, starting, running, regulation of spark carbureter, and throttle. Oiling.	Removal of carbon. Renewal of rings. Overhauling bearings, making an air tight gasket. Renewal of oil. Examination of spark plugs, setting commutator. Determining cause of faulty action and remedying same.
19. Machine shop.	.....	A study of capacity and limitations of ship's repair facilities.	
20. Lubrication.	Naval Machinery—Barton & Stickney. Practical Marine Engines—Durand. Lubrication and Lubricating Oils. Lt. Comdr. R. R. Smith (paper).	Forced lubrication, wick and hand feed. Kinds of oil—names, properties and uses.	Separating and straining of oil.
21. Turbines.	Naval Turbines—Meyers.	Principles of construction and operation of most prominent types.	Not installed.
22. Oil burning.	Bu. S. E. pamphlet Oil Burning. Practical Marine Engines—Durand.	Lighting off, air pressure, oil pressure; regulation. Principles of oil burning, etc.	Not installed.

ENGINEER COURSE FOR OFFICERS UNDER TRAINING—CONTINUED

PART 2.—EVOLUTIONS

Subject	Reference for study	Operation	Repairs and upkeep
1. Emergency drills—Organization, Fire Collision, Abandon ship, General Quarters, Torpedo defence. Repair Stations.	Ship's organization bills. Ship and Gun Drill—1916. Naval Engines and Machinery—Barton.	A study of the principles of organization. Making up station bills. Duties of the officer of the watch for each drill. Engine-room, fireroom and auxiliary station dispositions. Reports made. Watch duty.	Revision due to changes. See emergency bill for casualties.
2. Casualty drills—probable derangements and action to be taken.	Ship's casualty bill.	Actual drill at each casualty.	As per bill.
3. The officer of the watch underway.	U. S. Navy Regulations.	Watch standing.	
4. Getting underway.	U. S. Navy Regulations. Naval Machinery—Barton & Stickney. Practical Marine Engines—Durand.	Watch standing. Actual starting of each auxiliary in proper order. Warming up. Lighting up boilers and cutting in, etc.	
5. Securing.	U. S. Navy Regulations. Naval Machinery—Barton & Stickney. Practical Marine Machinery—Durand.	Watch standing. Dying out boilers, draining steam lines, securing stops, and main engines and auxiliaries.	
6. Banking fires and standing by—spreading fires.	U. S. Navy Regulations. Bu. S. E. pamphlet on boilers. Practical Marine Engines—Durand. Naval Machinery—Barton & Stickney.	Watch standing. Burning down, clinkering, and banking of fires. Stops. Pressures under banked fires. Precautions—spreading and cutting in.	
7. The officer of the watch in port.	U. S. Navy Regulations. U. S. Atlantic Fleet Regulations. Naval Machinery—Barton & Stickney. Ship's Regulations.	Watch standing, Day's duty, Inspection of power boats, overhaul, cleaning, routine, reports made.	
8. Coaling ship.	U. S. Navy Regulations.	Inspections, tally, estimates, coaling, rigging chutes, etc.	

ENGINEER COURSE FOR OFFICERS UNDER TRAINING—CONTINUED

PART 3.—ROUTINE UPKEEP

Subject	Reference for study	Repairs and upkeep
1. Main Engines.	U. S. Navy Regulations. Bu. S. E. pamphlet "Instructions."	Examination of cylinders and valves after runs. Overhaul of bearings. Examination of oil service and cleaning. Examination of water service and repairs. Quarterly examination of holding down bolts.
2. Main engine auxiliaries.	U. S. Navy Regulations. Bu. S. E. pamphlet "Pumps." Bu. S. E. pamphlet "Instructions."	Examination of condensers—semi-annual and when testing over .9 grains chlorine per gallon. Renewal tubes, ferrules and zincs. Testing after repairs. Setting of air pump steam valves. Renewal of packing, valves and valves springs. Circulating engine.
3. Auxiliary condensers, F & B pumps, feed pumps.	U. S. Navy Regulations. Bu. S. E. pamphlet "Instructions." Bu. S. E. pamphlet "Pumps."	Periodical examination of condensers for corrosion, and for leaks when test is over .9 grains chlorine per gallon. Renewal of tubes, ferrules, zincs; air pump valves, springs, etc.; testing after repairs. Repacking of pumps, renewal of rods, valves, springs, etc.
4. Boilers.	U. S. Navy Regulations. Bu. S. E. pamphlet "Boilers." Bu. S. E. pamphlet "Water Test." Naval Boilers—Lyons & Hinds. Practical Marine Engines—Durand.	Boiling out—cleaning—renewal of gaskets. Testing. Overhaul of valves, gauges, stops. Setting of safety valves. Renewal of gauge glasses, grate bars, etc. (Zincs where compound is not used.) Steaming hours allowed.
5. Auxiliary machinery.	U. S. Navy Regulations. Bu. S. E. pamphlet "Instructions."	Periodical examination and reports. Breakage, repairs and renewal of valves, seats, bearings, etc. Laying up for cold weather. Repacking, etc.
6. Coal Bunkers.	U. S. Navy Regulations.	Care and preservation. Ventilation, fire precautions. Lighting. Water tightness. Inspections.
7. Double bottoms. Drainage.	U. S. Navy Regulations. Naval Construction—Robinson.	Care and preservation. Water bottoms for feed. Reserve bottoms. Strainers. Sluice gates. Overhaul required. Paints used.
8. Docking.	U. S. Navy Regulations.	Examination of outboard valves and strainers. Renewal of zincs. Examination of propellers, shafting, struts, zincs.
9. Navy Yard Repairs.	U. S. Navy Regulations.	Inspection of progress and methods. Ship's work in connection with same.

ENGINEER COURSE FOR OFFICERS UNDER TRAINING—CONTINUED

PART 4.—STORES AND RECORDS

Subject	Reference for study	Procedure
1. The Log.	U. S. Navy Regulations.	The rough log. Coal reports from firerooms. Water consumption form. Rough reports from ice machines, and evaporators. Oil reports from storerooms keeper. The smooth log, embodying all of the above data sheets signed by the watch officer, engineer officer and submitted to the commanding officer daily.
2. Coal Reports.	U. S. Navy Regulations. Engineering Competitions.	Double entry tally sheets for each bunker kept daily. Checking by estimate daily and before and after coaling. Expending overs and unders. Noon report of coal used and on hand to captain.
3. Daily reports from all stations on improvised forms. Ice machines, Evaporators, Lubricating oil. Fresh water used, both for ship's tanks and for make-up feed. Water tests.	U. S. Navy Regulations.	Reports to show data for information of engineer officer as follows:—Hours of operation, temperatures, pressures, amounts received and expended, sources and outlets. Alkalinity and salinity of all water units.
4. Repairs and machinery record.	U. S. Navy Regulations. Confidential Bulletin of Engineering Information No. 33, of May 11, 1916. U. S. Atlantic Fleet Regulations.	Daily progress of repairs logged by index number. Individual card for each unit, showing daily progress, when occurring. A weekly list showing progress of repairs for ship's use, including navy yard, repair ship, and ship's force job orders.
5. Quarterly & monthly reports.	U. S. Navy Regulations. U. S. Atlantic Fleet Regulations.	Special reports on condition of machinery under cognizance of other bureaus. Fuel report. Log submitted quarterly with machinery index and comment of engineer officer on condition of machinery. Boiler record sheets. Reports of changes in power boat machinery.
6. Navy Yard Repairs and Alterations. Repair ship repairs.	U. S. Navy Regulations. U. S. Atlantic Fleet Regulations.	A study of the correct procedure and form for initiating repairs. Navy yard job orders. Inspections.
7. Ship's job order system.	S & A form 316. General Order No. 232.	Job orders issued for all work undertaken on board to permit cost accounting.
8. Stores.	Allowance lists. U. S. Navy Regulations. S & A form 307. Ship's forms for cotton waste, soap, lubricating oil, etc.	Title "B" stores and spare parts. Orders on G. S. K. for title "C" or expendible stores, orders for title "D" stores, (repairs to title "A"), orders for title "P" stores, (repairs to title "B"). Minimum amounts of grate bars, lubricating oils, gaskets, etc., to be kept on hand. Stores kept on hand. Duties of the G. S. K. and storeroom keepers. Military importance of conservation of stores. Inventories required. Requisitions and surveys.
9. Steaming competition.	Engineering Competitions—Confidential.	The Engineering Multiple. How made up. Daily records required. Methods of economy. Methods of economy in water, coal and lubricating oil.

ENGINEER COURSE FOR OFFICERS UNDER TRAINING—CONTINUED

PART 5.—ELECTRICAL

		Operation	Repairs and upkeep

9. Steaming competition.	Engineering Competitions—Confidential.	required. Requisitions and surveys. The Engineering Multiple. How made up. Daily records required. Methods of economy. Methods of economy in water, coal and lubricating oil.	

ENGINEER COURSE FOR OFFICERS UNDER TRAINING—CONTINUED

PART 5.—ELECTRICAL

Subject	Reference for study	Operation	Repairs and upkeep
1. The dynamo engine and auxiliaries.	Naval Electricians Text Book—Bullard. Ship's blue prints.	Starting and stopping, draining and lubrication. Operation of dynamo condensing plant. Shifting to engine-room condenser.	Repacking. Overhaul of bearings. Renewal of oil. Adjustment of governor.
2. Generator and switchboard.	Naval Electricians Text Book—Bullard. Ship's blue prints.	Cutting in a generator. Cutting out. Running in parallel. Regulation of voltage and distribution of load. Operating switchboard. Watch in dynamo room.	Faults and remedies of dynamos and motors. See Bullard.
3. Circuits—power, light, searchlights.	Naval Electricians Text Book—Bullard. Ship's blue prints.	Cutting in and out. Nomenclature and designation of circuits. Loads used. Circuit breakers and fuses.	Ground tests. Insulation tests. Renewal of fuses. Assignment of circuits to electricians for upkeep, including lights, fans, power units and fixtures.
4. Electrical operating units—motors, searchlights, etc.	Naval Electricians Text Book—Bullard.	The operation of searchlights. Special applications of motors to naval uses. Ship's interior communication system.	Uses. Routine inspections required. Troubles experienced. Remedies.
5. Auxiliary generating units for interior communication and fire control.	Naval Electricians Text Book—Bullard. Ship's blue prints.	Starting, stopping, regulation, switchboard.	Faults and remedies of dynamos and motors. See Bullard.
6. Fire Control Installation.	Ship's blue prints. Confidential pamphlets on standard fire control installation. Target Practice reports.	A study of the plotting room switchboard. Designation of all standard circuits by letters. The fire control telephone—visuals. Buzzer circuits. The plotting room in operation.	Telephone troubles. Circuit troubles. Buzzer troubles. Daily tests. Probable faults and casualties. Target practice.
7. Storage Batteries. Sulphuric acid—lead batteries. The Edison Battery.	Naval Electricians Text Book—Bullard. Manufacturers pamphlets.	Charging and discharging. Renewal or strengthening of electrolyte. Testing. The uses of storage batteries on ship board. Power boats. Gun fire.	Buckling of plates—sulphating—over charging—over discharging. Overhaul and renewal of plates. Record of tests and charging kept.
8. Radio—The Installation.	Naval Electricians Text Book—Bullard. Manual of Wireless Telegraphy—Robinson. Ship's blue prints.	A study of the installation. Starting up. Adjustments in operation of sending sets and receiving sets. Testing for wave length.	Overhaul of motor generator, antenna, renewal of condenser jars. Tests of circuits for breaks, leakage and radiation losses.
		Procedure	
9. Stores and Records.	See part four. The daily rough log. The quarterly report of electrical plant.	The record of oil used, lamps expended. Daily reports to log-room of all repairs undertaken. Keeping of rough electrical log by watches. Records of storage batteries maintained. Requests for material, spare parts and surveys.	

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

THE ECONOMICAL EMPLOYMENT OF AUXILIARY EXHAUST STEAM

By LIEUTENANT E. E. WILSON, U. S. Navy

One of the important engineering problems of the day is the attainment of economy by the recovery of waste products through their employment in useful work. In this class comes the recovery of waste heat in the auxiliary exhaust steam—a process which has been well developed in shore practice but more or less neglected by marine engineers. It is the object here to describe one method of recovering this heat which has been entirely successful, with the idea that any features of this particular problem which may be adapted to other installations may be made available.

The fundamental principles involved are as follows:

(1) The total heat available for recovery in the latent heat of the exhaust steam may be four or five times that which is converted into useful work in the auxiliaries themselves.

(2) This heat, which is not available for further work in engines, may be recovered in heat transfer apparatus, such as feed heaters.

(3) Not all the exhaust steam is available for recovery, for the reason that a large part of the machinery depends upon high vacuua for its efficiency, and the temperatures corresponding to these vacuua are too low to permit the transfer of heat to any useful purpose. Generator turbines and main engines come under this head.

(4) The exhaust of such auxiliaries as pumps and reciprocating units of small sizes is immediately available, however, for the reason that these engines are not capable of utilizing high vacuua and are easily operated against a back pressure.

(5) At a back pressure of 15 pounds gage, the temperature of the steam is in the neighborhood of 250 degrees F., and this tem-

perature is such as to permit doing useful heating work, warming some substance that needs warming by *condensing* the steam.

(6) If all the exhaust steam can be condensed in the process there is no need of the auxiliary condenser, and the steam for this auxiliary may be saved.

(7) If at the same time the auxiliary exhaust steam is utilized to do heating formerly required of live steam, then the economy becomes very important. In the particular installation to be outlined, the saving was of the order of 25 per cent of the average daily expenditure in port.

In ordinary marine practice the above principles are employed in the heating of the boiler feed water and sometimes in other warming about the ship. They seldom go further, however, yet the most important economy is possible in the use of the exhaust steam in the evaporators, and it is intended to show here that no special design of low pressure evaporators is needed to attain complete success.

In Figure 1 a sketch has been prepared of the particular arrangement to be described. For the sake of clearness a simple line sketch is utilized and the layout is made in the form of circuits. From the feed tank, water is delivered to the boiler where it is vaporized and sent out to the main steam line. In parallel across the main steam and auxiliary exhaust lines are shown the many auxiliaries whose heat is available for recovery. The pressure on the main line is boiler pressure, while that on the exhaust line is the back pressure, and the corresponding temperatures are noted. This may be called the high-pressure circuit.

From the auxiliary exhaust line to the feed tank the various heat transfer apparatus is shown in parallel, just as the engines were shown in parallel in the high-pressure circuit. In this apparatus, however, the steam is condensed and returned to the feed tank as water, thus completing the whole round. Two exceptions to the above are noted at the right. One of these is the dynamo circuit, which by-passes the auxiliary exhaust line entirely and condenses the steam in its own condenser. The other is the high-pressure drain line which accomplishes the same thing by condensing the steam in the main steam line and trapping it back to the feed tank.

The circuits have been numbered and can now be followed out. Circuit No. 1 is the high-pressure drain circuit mentioned above. Water comes back through it at about the temperature of the

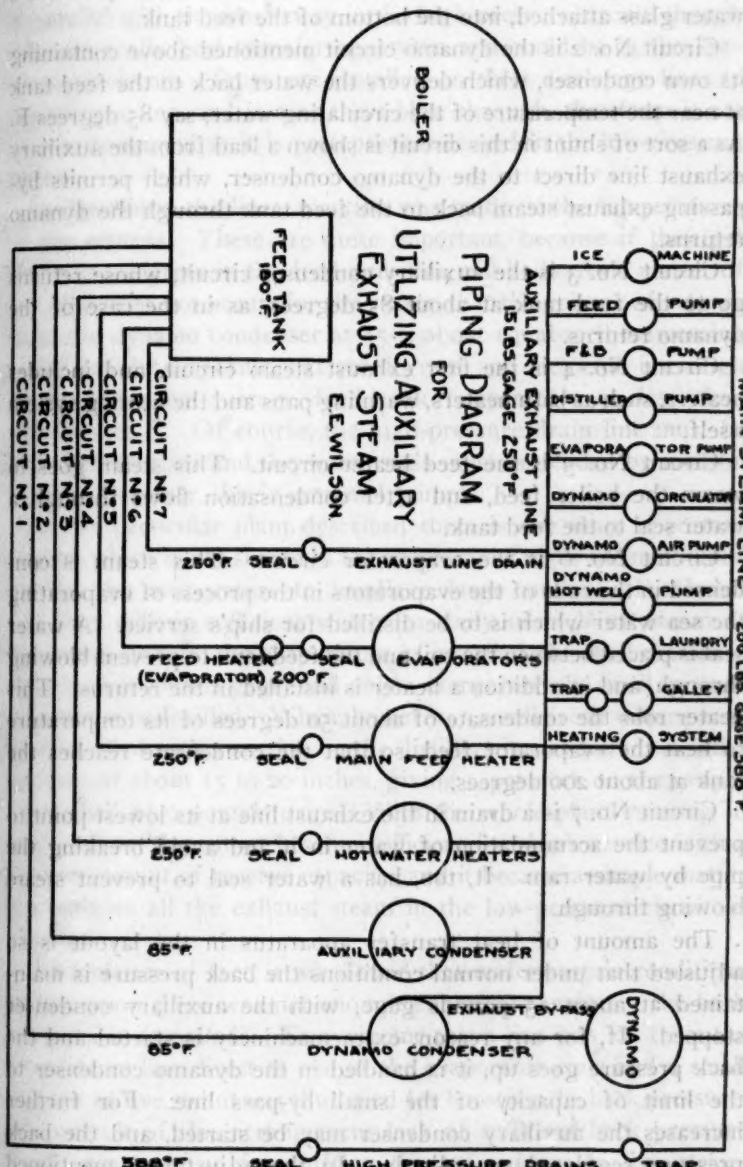
BOILER
FEED TANK 180°F.
PIPING DIAGRAM FOR UTILIZING AUXILIARY EXHAUST STEAM
E.E. WILSON
AUXILIARY EXHAUST LINE 15 LBS. GAGE 250°F.
MAIN STEAM LINE 200 LBS. GAGE 388°F.
ICE MACHINE
FEED PUMP
F&D PUMP
DISTILLER PUMP
EVAPORATOR PUMP
DYNAMO CIRCULATOR
DYNAMO AIR PUMP
DYNAMO HOT WELL PUMP
TRAP LAUNDRY
TRAP GALLEY
HEATING SYSTEM
CIRCUIT N°1
CIRCUIT N°2
CIRCUIT N°3
CIRCUIT N°4
CIRCUIT N°5
CIRCUIT N°6
CIRCUIT N°7
250°F SEAL EXHAUST LINE DRAIN
FEED HEATER (EVAPORATOR) 200°F
SEAL EVAPORATORS
250°F SEAL MAIN FEED HEATER
250°F SEAL HOT WATER HEATERS
85°F AUXILIARY CONDENSER
EXHAUST BY-PASS
85°F DYNAMO CONDENSER
DYNAMO
388°F SEAL HIGH PRESSURE DRAINS TRAP

FIG. 1.

steam, say 380 degrees F., and is discharged, through a pot with a water glass attached, into the bottom of the feed tank.

Circuit No. 2 is the dynamo circuit mentioned above containing its own condenser, which delivers the water back to the feed tank at near the temperature of the circulating water, say 85 degrees F. As a sort of shunt in this circuit is shown a lead from the auxiliary exhaust line direct to the dynamo condenser, which permits by-passing exhaust steam back to the feed tank through the dynamo returns.

Circuit No. 3 is the auxiliary condenser circuit, whose returns go to the feed tank at about 85 degrees, as in the case of the dynamo returns.

Circuit No. 4 is the first exhaust steam circuit, and includes heaters, such as bath heaters, warming pans and the heating system itself.

Circuit No. 5 is the feed heater circuit. This steam goes to warm the boiler feed, and after condensation flows through a water seal to the feed tank.

Circuit No. 6 is the evaporator circuit. This steam is condensed in the coils of the evaporators in the process of evaporating the sea water which is to be distilled for ship's service. A water seal is placed between the coil and the feed tank to prevent blowing through, and in addition a heater is installed in the returns. This heater robs the condensate of about 50 degrees of its temperature to heat the evaporator feed, so that the condensate reaches the tank at about 200 degrees.

Circuit No. 7 is a drain in the exhaust line at its lowest point to prevent the accumulation of water in it and avoid breaking the pipe by water ram. It, too, has a water seal to prevent steam blowing through.

The amount of heat transfer apparatus in the layout is so adjusted that under normal conditions the back pressure is maintained at about 15 pounds gage, with the auxiliary condenser stopped. If, for any reason, extra machinery is started and the back pressure goes up, it is handled in the dynamo condenser to the limit of capacity of the small by-pass line. For further increases the auxiliary condenser may be started, and the back pressure regulated accordingly. In the adjustment mentioned above, it was found desirable to keep the laundry and galley, and at times the heating system, on the high-pressure steam because the

exhaust was not warm enough. These places are therefore shown in parallel with the machinery in the high-pressure circuit, though they are really heat transfer apparatus and could be in the low-pressure circuit. Traps are installed on their discharge lines to the exhaust line, and in case these blow through, the steam is not ordinarily wasted as it is promptly condensed in the low-pressure circuit.

In describing the lines, mention was made of the temperatures of the returns. These are quite important, because if they get above 212 degrees in the feed tank this will boil. As a matter of fact, this does not occur, for the reason that the volume of returns from the dynamo condenser at 85 is about equal to those coming back from the evaporators at 200 degrees, and the result is enough to maintain the average feed tank temperature at less than 180 degrees F. Of course, the high-pressure drain line must be kept well trapped and the water seals must be tended by men on watch. However, this is extremely simple.

In the particular plant described there is one most important feature which is not shown in the diagram. This is the method of getting the evaporators to handle a large amount of exhaust and thus deliver sufficient water for daily use. With steam at 15 pounds gage in the evaporators as installed, the shell pressures ran about 8 pounds gage, and only a comparatively small amount of water was distilled. When, however, a small fresh water pump was installed with a suction on the distillers it was found to pull a vacuum of about 15 to 20 inches, giving a pressure on the evaporator shell of 0 pounds gage. With the whole plant running in single effect, the output became sufficient for ship's service with a certain amount of reserve capacity, and it became a simple matter to condense all the exhaust steam in the low-pressure circuit as shown.

As a matter of fact, it was found that under certain conditions of operation there was not enough exhaust to maintain the back pressure at 15 pounds. To overcome this a line was led from the main steam line direct to one of the evaporator coils and a small amount of live steam was thus used for boosting the back pressure. As a result of this arrangement lack of sufficient back pressure need be no excuse for shifting the evaporators to live steam. Instead, by boosting the pressure the exhaust was still rendered available for use and the evaporator output was maintained.

The outline above constitutes a general description of a plant in which a net saving of 25 per cent has been accomplished by recovery of waste heat in the auxiliary exhaust steam. Not only is the large quantity of heat which was wasted in an auxiliary condenser completely recovered, but in addition the energy formerly required to run the condenser and waste the heat is saved. The principles here laid down are available for application in any marine installation, large or small, and for this purpose two outstanding features must be emphasized: (a) If a large amount of exhaust is available for recovery it can be handled by means of an air pump on the distillers. The greater the vacuum pulled the greater the amount of water evaporated, and the greater the quantity of steam condensed in coils. (b) If a small amount of exhaust is available for recovery the back pressure can still be boosted with a little live steam and the waste heat utilized as before. These features permit the adjustment to local conditions and insure success in every case.

In the arrangement described, the water distilled has been absolutely fresh at all times, and the danger of making salt water so characteristic of high-pressure evaporators has been obviated.

The interesting feature of the whole installation is a sort of paradox in seagoing engineering, *i. e.*, it is more economical to distil water than not to do so, for the reason that with the evaporators secured it is necessary to run an auxiliary condenser.

U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

ATTACKS ON UNARMED ENEMY MERCHANT VESSELS[1]

By CHARLES CHENEY HYDE,
Of the Chicago Bar, Professor of International Law in Northwestern University Law School

May a belligerent warship lawfully attack at sight an unarmed enemy merchantman? It may occasion surprise that a speaker before the American Society of International Law should venture to raise such an inquiry at such a time. The writer shares, however, what is doubtless the view of all here present, that a belligerent warship normally lacks that right. While such a vessel may lawfully attempt to gain control of or destroy all enemy ships not exempt from capture, the law of nations is vitally concerned with the processes employed. It does not sanction the needless sacrifice of life or property.

It is still worth while to observe how the immunity of the merchantman from attack at sight has developed, and again, what conduct, if any, on the part of such a vessel subjects it to treatment such as may be lawfully accorded a public armed ship. Finally, it is important to consider whether the equities of the merchantman are restricted by reason of the nature and limitations of the fighting craft of the enemy.

Long before the European War, nations were agreed that unarmed enemy merchant vessels were in general not subject to attack at sight, and that if they were guilty of no improper conduct, the propriety of attack or destruction was dependent upon the giving of opportunity for the removal of persons on board to a place of safety. Such respect for human life was, moreover, broadly acknowledged without discrimination between carriers of passengers and freight, and irrespective of the nationality of the persons involved.

[1] Reprinted from the Proceedings of the American Society of International Law at its eleventh annual meeting held at Washington, D. C., April 26-28, 1917.

In days when privateering flourished the unarmed merchantman was a thing unknown. Ships of commerce did not put to sea without substantial armament. This at times sufficed to enable the possessor to offer prolonged resistance and positive danger to any type of vessel encountered. Consequently there was no reason to deal lightly with a vessel itself capable of initiating hostilities, and possibly alert to do so whenever favorable opportunity presented itself. Dictates of humanity could only urge restraint when at least, apart from other considerations, the merchantman ceased to be a source of danger to the naval forces of the enemy. The earliest instructions to American privateers, dated April 3, 1776, authorized the commanders by force of arms to "attack, subdue, and take all ships and other vessels" belonging to the inhabitants of the enemy's country. There was no suggestion that any ships belonging to them should be treated with leniency. As doubtless the entire merchant marine of the enemy was armed, at least defensively, it was logical that the instructions should place all enemy vessels in the same category. The instructions of President Madison to American privateers issued in 1812, stated that "towards enemy vessels and their crews, you are to proceed, in exercising the rights of war, with all the justice and humanity which characterize the nation of which you are members." No discrimination was, however, made in respect to any class of enemy ships, and doubtless none was thought of.

With the abandonment of privateering and the confining of hostilities to public vessels specially adapted for war, the arming of merchantmen became increasingly infrequent because of the helplessness of such vessels in engagements with a warship, which was the only type of craft from which acts of aggression were to be anticipated. The latter, moreover, with its vast preponderance of offensive power and defensive strength, found the merchantman a negligible danger and regarded it rather as an object of prey. Thus the very weakness of the latter became a safeguard, and the unarmed merchantman gained the right to be called upon to surrender before attack.

Although useful to its own state as a carrier of articles needed for the prosecution of war, the enemy merchantman did not lose the right to demand a signal to surrender before being attacked. Respect for humanity still outweighed the claims of military necessity, a fact which neither the writings of publicists nor the naval codes of maritime Powers purported to deny.

At the present time an unarmed enemy merchant vessel, such as a trans-Atlantic liner of great tonnage and high speed, although designed and employed primarily for the transportation of passengers and mail, is still capable of rendering incidentally substantial military service as a carrier of war material. Its speed may enable the vessel to outdistance any pursuer and to keep beyond the range of a signal to stop. Wireless telegraphic equipment may offer means of summoning aid whenever needed. The instant destruction of the ship without warning may thus offer the sole means of preventing its escape and the delivery of contraband articles at their destination. The success of the voyage, despite its principal purpose, may serve to prolong the war by adding to the resources of the state to which the vessel belongs. It is not believed, however, that the indirect harm to be wrought in consequence of escape equals that to be anticipated from the deliberate disregard and destruction of the lives of the occupants of the ship. Claims of military necessity still fail to turn the scales of justice.

The unarmed freighter, not so given over to the transportation of war material as to be deemed primarily an instrument of belligerent service, is believed to be entitled to similar treatment. A total absence of passengers does not deprive officers and crew of safeguards which are fairly due noncombatants. Nor does the smallness in number of the individuals whose lives are at stake weaken the equities of the occupants of the ship, unless it is bent on an essentially hostile mission. The slower speed of the vessel as compared with that of the passenger liner, lessens, moreover, the chances of its escape in case of pursuit.

Doubtless the peculiar occupation or sinister conduct of an unarmed merchantman may so strengthen the equities of an enemy warship as to cause the claims of military necessity to outweigh every other consideration. The cases falling within this category do not, however, weaken the principle that the carrier is normally exempt from attack at sight, or that the enemy vessel which fires upon it without warning assumes the burden of showing that its victim has forfeited the right to exemption from such treatment.

The question presents itself whether the right of exemption is forfeited by the attempt of the merchantman to escape capture. All will agree that any form of resistance by such a vessel destroys its immunity. This is true when, for example, an unarmed surface craft attempts to ram its assailant. It is also true, ac-

cording to the Department of State, when an armed merchantman, prior to a summons to surrender, and yet aware of the approach of an enemy warship, uses its armament to keep the enemy at a distance.

The attempt of an unarmed merchantman of any type to escape, either by flight on the surface or by submerging, prior to a signal to surrender or to come to, and with the obvious purpose of keeping beyond the range of a recognized pursuer, does not authorize the latter to attack the vessel without warning. The situation is otherwise, however, when the vessel, although unarmed, is a public ship, or one engaged primarily in a public service connected with the prosecution of the war.

Any belligerent vessel of any kind or type exposes itself to instant attack, if after a reasonable summons to surrender, it persists by any process, in an attempt to escape. After the receipt of such a signal or following the abandonment of flight, in consequence thereof, the attempt to summon aid by wireless telegraph or other process, is analogous to resistance and justifies the enemy in taking summary steps to cause its discontinuance. These might produce a difficult situation, in case the call for aid brought to the scene an armed ship endangering the safety of the enemy or frustrating its attempt to effect a capture. In such a situation, however, the Department of State appears to hold that the mere effort to secure assistance should not alter the obligation of the warship seeking to make the capture to respect the safety of the lives of those on board the merchantman.

As between opposing belligerents, the employment of ruses untainted by perfidy, such as the use by an unarmed ship of a neutral flag in order to prevent the detection of its nationality, does not wholly deprive the user of the right to enjoy an immunity from attack at sight which it would otherwise possess. Thus, the mere flying of such a flag by a vessel still recognized by the enemy as a belligerent unarmed merchantman would not suffice to justify an attempt to destroy it without warning. Even if an opposing warship were in fact deceived by the device, and in consequence failed to avail itself of its power to make an effective summons to surrender, it would not be justified if again sighting the vessel in endeavoring to prevent its escape at all hazards, and to that end, if no other means were possible, in attacking it without warning. Inasmuch as the use of a false flag by an unarmed belligerent ship

is commonly for the purpose of aiding escape by flight rather than of offering resistance, the attempt to deceive, whether successful or unsuccessful, is neither perfidious nor harmful to the pursuer. Detection should not, therefore, excuse attack without warning upon the ship resorting to such a ruse.

The situation is otherwise, however, where the use of the flag by an unarmed ship is for the purpose of alluring a hostile cruiser into waters where it will be subjected to attack by other vessels, or its safety endangered by unknown mines. In such a case it is believed that the vessel resorting to the ruse may be fairly attacked without warning upon the discovery of its design.

The present war has given rise to inquiry whether the existing rules of maritime war with respect to attacks upon unarmed enemy merchantmen are applicable to the operations of submarine naval vessels.

It will be recalled that on February 4, 1915, the German Admiralty announced that the waters surrounding Great Britain and Ireland, including the whole British Channel, were to be deemed a war zone, and that on and after the 18th day of February, 1915, "every enemy merchant ship" found in the zone would be destroyed "without its being always possible to avert the dangers threatening the crews and passengers on that account." Lack of time prevents discussion of our diplomatic correspondence with Germany which immediately ensued.

On May 7, 1915, the *S. S. Lusitania* was torpedoed without warning by a German submarine off the Old Head of Kinsale, Ireland. The vessel sank within 20 minutes. Eleven hundred and ninety-eight men, women, and children were drowned, of whom 124 were American passengers. The cargo was a general one of the ordinary kind, consisting in part, however, of about 5000 cases of cartridges. The ship was unarmed; it carried no masked guns or trained gunners, or special ammunition. It was not transporting troops, and it had violated no laws of the United States. On August 19, 1915, the British liner *Arabic* was torpedoed by a German submarine off the coast of Ireland, and on March 24, 1916, the French channel steamer *Sussex*, while crossing from Folkstone to Dieppe. Both were unarmed passenger ships, attacked without warning, and on board of which American passengers were among the victims suffering injury or death.

These deplorable acts, arousing deep indignation throughout the United States, presented the following problems: whether undersea war vessels could and should be subjected to the existing rules respecting attacks on unarmed enemy merchantmen; whether, even if the foregoing question were to be answered affirmatively, Germany had a valid excuse for not observing them by reason of alleged excesses of its enemies; and whether knowledge of the presence of neutral passengers on board belligerent merchantmen altered the normal obligations of the opposing submarine.

In its first note to Germany after the destruction of the *Lusitania*, the Department of State declared it to be a "practical impossibility" to employ submarines against enemy commerce "without disregarding those rules of fairness, reason, justice, and humanity, which all modern opinion regards as imperative." Thus it was said to be practically impossible for the officers of a submarine to visit a merchantman at sea and examine her papers and cargo and "to make a prize of her"; that if they could not put a prize crew on board of her, they could not sink her without leaving the several occupants to the mercy of the sea in small boats; and hence that manifestly submarines could not be used against merchantmen "without an inevitable violation of many sacred principles of justice and humanity." On July 21, following, the department declared, however, that the previous two months had indicated that it was possible and practicable to conduct submarine operations in substantial accord with the accepted practices of regulated warfare, and that the whole world had looked with interest and satisfaction at the demonstration of that possibility by German naval commanders. Finally, after the series of lamentable events, culminating in the torpedoing of the *S. S. Sussex*, the department renewed the stand which it had taken at the outset, to the effect that the use of submarines for the destruction of enemy commerce was of necessity "utterly incompatible with the principles of humanity, and the sacred immunities of noncombatants." Nevertheless, the United States appears to have demanded and expected an abandonment of the existing "methods of submarine warfare" rather than the use of undersea vessels as commerce destroyers.

If the limited means possessed by a submarine of ascertaining, by any process, the identity or nature or national character or movements of any ship encountered, necessarily involves danger

of indiscriminate attack at sight upon public or private vessels, armed or unarmed, warships or passenger liners, it would be difficult to justify under plea of military necessity the use of such an instrument of naval warfare, unless it be acknowledged that a belligerent may employ any means of reducing its foe. Maritime states have not as yet agreed thus to subordinate the claims of humanity, or so to sanction wanton disregard of unoffending human life. It is not to be anticipated that they will tolerate the removal from any form of war vessels of the duty to apprise itself as to the nature and character of enemy ships encountered as a condition precedent to lawful attack upon them.

If a submarine encounters an unarmed enemy merchantman, normally immune from attack at sight, and not guilty of conduct forfeiting that privilege, no right to attack without warning is apparent. Nor is any to be derived from the difficulty which the former may anticipate in providing for the safety of the occupants of the latter. After giving adequate warning, no destruction of the vessel should be attempted until its occupants are assured of at least a temporary place of refuge. The life-boats offer at best, as the Department of State has indicated, "a poor measure of safety." On numerous occasions great loss of life has ensued when the occupants of a merchantman have, pursuant to orders, endeavored to take to the boats.

The cases of the British ship *Falaba,* destroyed by a German submarine March 28, 1915, the Italian ship *Ancona,* attacked by an Austrian submarine November 7, 1915, and that of the American ship *Healdton,* torpedoed March 21, 1917, may be cited as instances. Recourse to the boats in a heavy sea must always be attended with great danger. Moreover, a life-boat, even if it keeps afloat, affords slight protection from exposure to those long obliged to depend upon it as their sole place of refuge in inclement weather or on an unfrequented sea. Hence the reasonableness of causing passengers and crew of an unoffending merchantman to put to sea in open boats seems to depend upon the presence of special circumstances indicative of the absence of those dangers usually attending such procedure.

Mere incapacity of a naval submarine to offer a place of refuge on its own decks does not justify a disregard of the safety of the persons aboard the enemy merchantman that has surrendered or obeyed a signal to stop. It rather indicates a limitation of the

right to destroy the ship until by some process the safety of its occupants has been assured. Should a small surface craft such as a torpedo-boat destroyer, or a naval vessel even more diminutive, fall in with an enemy passenger liner having 2000 persons aboard, the inability of the former to offer a place of refuge to a majority of those persons, or to spare an adequate prize crew, would not in itself be deemed to justify the demand that the occupants of the liner take to the boats, or otherwise jeopardize their safety, in order to permit the destruction of the vessel on which they were carried. The submarine is subject to the same duty.

In a word, the United States is believed to have taken an impregnable stand in its demand that the normal obligation of a warship not to attack at sight an unarmed enemy merchantman is applicable to undersea vessels, and that hence the right, if any, to employ them as commerce destroyers depends upon the power and disposition of those controlling them to respect that obligation.

In its official correspondence Germany did not assert that the rules of international law respecting the treatment due to unarmed merchantmen were inaccurately enunciated by the United States, or that submarine vessels were incapable of observing them. It was sought to excuse the practices of such vessels on the ground that the conduct of Great Britain was in such sharp defiance of international law that Germany was obliged to have recourse to a ruthless procedure by way of so-called retaliation. It is believed that the sufficiency of this plea depended upon proof that the enemies of Germany were in fact subjecting German merchantmen to treatment similar in kind to that which British and French vessels were being accorded. If British submarines had been attacking without warning German unarmed merchantmen in any zone of hostilities, a situation would have arisen which the United States might have had great difficulty in meeting. The British acts, of which Germany made complaint, were, however, of a widely different character. They did not contemplate the destruction of noncombatant human life on unoffending and unarmed vessels, and hence offered no adequate excuse for the commission of such acts by the enemy. Germany, therefore, owed a duty to every British subject aboard the *Lusitania* and on other British ships of similarly irreproachable conduct, which no acts on the part of the state to which those vessels belonged had served to

lessen. It may be observed, parenthetically, that the presence of neutral passengers on board the *Lusitania* did not alter the duty which Germany owed to that vessel. The obligation not to sink it at sight was one which was due an unarmed merchantman, irrespective of the nationality of its occupants. If the Cunard Company was at fault in encouraging neutral passengers to embark on the ill-fated ship, that fault lay in the failure to warn them that German submarines might not be deterred from wanton disregard of the duty not to sink an enemy merchantman at sight, by even the lawful presence on board of neutral passengers.

In a recent note from Austria-Hungary it is suggested that the necessary warning to a merchantman might be made before the departure of the vessel from port. This would imply that a belligerent has a right to free itself from every duty which the law of nations has imposed upon it with respect to noncombatant and unoffending human life, by giving notice that it will resort to every means in its power to capture or destroy even the unarmed merchant marine of the enemy. In response it may be said generally that the mere giving of notice can never justify lawlessness. To be more specific, however, a belligerent lacks the right to attack and destroy unarmed enemy merchantmen save under conditions which the law of nations, inspired by the dictates of humanity, has definitely established. It cannot modify those conditions at will.

It is unnecessary here to discuss the argument employed by the United States, before it became a belligerent, to combat the German pretensions. It suffices to note that the retaliatory plea was deemed inadequate and unresponsive to the demands of a neutral nation.

The most significant and satisfactory aspect of our diplomatic correspondence with Germany and Austria-Hungary is believed to have been the admissions drawn from both as to the duty of a belligerent, at least under normal circumstances, towards the unarmed merchant vessels of the enemy. On December 29, 1915, the Austro-Hungarian Foreign Office informed Mr. Penfield, in connection with the *Ancona* case, that:

> As concerns the principle expressed in the very esteemed note that hostile private ships, in so far as they do not flee or offer resistance, may not be destroyed without the persons on board having been placed in safety, the Imperial and Royal Government is able substantially to assent to this view of the Washington Cabinet.

The assurances given by Germany May 4, 1916, the withdrawal of which, on January 31, 1917, led to the severing of diplomatic relations by the United States on February 3, last, contained the following statement:

> In accordance with the general principles of visit and search and destruction of merchant vessels recognized by international law, such vessels, both within and without the area declared as naval war zone, shall not be sunk without warning and without saving human lives, unless these ships attempt to escape or offer resistance.

Here is proof that the rights of the unarmed enemy merchantman are recognized by international law, and that the duty with respect to warning and the saving of human life is as applicable to the submarine of the opposing belligerent as to its surface fighting craft. It is an acknowledgment that the United States has correctly enunciated the law. Whether it is to be maintained or abandoned depends upon the extent of the sacrifice which our country and the Powers with which it is happily in alliance are willing to make. The intensity of our own indignation at defiance of the law of nations is measured by the force we use to compel respect for it. For those of us who were born on this soil it is hard to believe that America is less sensitive to injustice than Europe, or less inclined to fight for principle. Those Americans who to-day, depressed by the conduct of our enemy, declare that international law no longer exists, misjudge the temper of this nation and forget its past. It is unthinkable that the United States, however reluctant to enter the war, will regard peace a blessing, until it has exhausted, if need be, its whole strength, to gain assurance from Germany of the principle that it is entitled to live its life as an independent state when and as long as it respects the law of nations, and no longer.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

"DON'T GIVE UP THE SHIP"

By COMMANDER THOMAS DRAYTON PARKER, U.S. Navy (Retired)

Two facts about the navy we have all known from infancy: Perry used fewer words per unit captured than any man since Cæsar; and Lawrence said, "Don't give up the ship!"

Luck plays its part in the Hall of Fame. Lawrence, like Perry, was built on heroic lines; but 37 years before he lost his life and ship, impetuously fighting when unprepared, another American lost his life, saved his ship, and uttered almost identical words—words that, in his case, have been forgotten. This earlier, uncouth hero is unknown to the vast majority of Americans. Of the early Revolutionary period, he was not a regular naval officer; he lacked the training and the fine presence of a Lawrence or a Decatur; he swore horribly—and with it all he "did his bit" in a very heroic way.

The captain in question was James Mugford of Marblehead, one of the first sea victims of the Revolution. Not even a tugboat bears his name.

When the Revolution began, Mugford, aged about 36, was impressed by the British and confined on a warship in his home port. While a prisoner he heard talk of a powder ship expected by the British; and when released through the importunities of his young wife he made plans to capture this vessel. Being active and enterprising (in more ways than one) he secured the command of an armed schooner, the *Franklin*—a terrifying craft of 50 to 75 tons. Her armament, which left little space for stores or crew, consisted of six carriage guns, a number of swivel guns,[1] etc. The crew numbered 17.

Mugford hardly had his commission, signed by General Ward in command of land forces at Boston, when the general, hearing

[1] General Ward's rèport. Other accounts refer to four 4-pounders, etc.

"damaging rumors," sent an express messenger to cancel it. But Mugford, who was a man of action, had sailed with the *Franklin*.

Near Boston he promptly fell in with his powder ship, the Britisher *Hope*, Captain Lumsdale, of 300 tons and a crew of 21 men. Accounts as to her armament differ. Mr. Roads, a Marblehead chronicler, gives this as six guns; the inscription on the Marblehead monument says 10; other historians give other figures. At any rate, being from four to six times as large, she was at least a fair match for the *Franklin*. Moreover a British squadron under Commodore Banks was lying in the offing, in Nantasket Roads. Realizing the bigness of his enemy and the danger from a supporting squadron, Mugford warned his crew that they were in for a desperate fight—but the British captain surrendered promptly, preferring strategy to fighting. In fact, Mugford on boarding found him in the act of cutting the topsail ties and halliards.

"Mugford heard the orders, and knew the consequence of executing them—that the sailing of the ship would be so long prevented that the men-of-war's boats would recover her. He therefore opened with a volley of oaths and execrations: and in the most horrid manner threatened the captain and all on board with immediate death if the orders were executed, upon which the captain was so terrified as to desist."[3]

The capture was a most important one. Washington, in desperate need of ammunition, secured from the *Hope* 1500 barrels of gunpowder, 1000 carbines, a number of gun carriages, and a large assortment of pioneer tools and artillery instruments. The prize ran aground in Pulling Point Gut and, as a precaution, was unloaded by boats.

Having delivered the booty, Mugford put to sea in the *Franklin* and anchored (or grounded) off Pulling Point. The *Lady Washington*, a small privateer that left in company, anchored close-to. Mugford then prepared for eventualities by getting springs on his cables, tricing up boarding nettings, and red-heating a quantity of 12-pound shot. Meanwhile the enemy, scenting an opportunity, decided to attack. During the night a stealthy ripple of oars was heard, and dim shapes of boats were sighted. The British were approaching with 13 or 14 boats and 200 armed men.

[3] Gordon's American Revolution, I, 71.

Mugford hailed.

"For God's sake don't shoot!" was the reply. "We are friends from Boston come to help you."

Mugford was too shrewd a Yankee to be caught by this simple trick; and while profanely denying any wish for "help," he delivered his broadside. Though several boats were sunk, the survivors piled alongside the *Franklin* and *Lady Washington*. Mugford's men dropped red hot cannon balls on their heads; and as they tried to hold on with hands instead of grappling irons, lopped off the hands in rapid succession. General Ward's report credits Mugford personally with *five pairs;* and one sailor boasted of nine.

In the thick of the fight Mugford was shot or run through with a lance, and mortally wounded. As they were passing him below to die, he painfully told the mate:

"I am a dead man; *but do not give up the vessel;* you will be able to beat them off; if not, cut the cable and run the schooner on shore!"

Not so terse and well-rounded as "Don't give up the ship!" or as "Give the men their grog!" (if that is what Nelson said)—but fine enough in sentiment, complete enough *in thought,* for a dying man.

They did not give up the ship. The British retired with a loss of 70 men. Mugford and one other were the only American casualties.

Of two brave men one is known everywhere, the other forgotten except locally. Why? Lawrence was a regular commanding a regular ship in a regular war; his personality was picturesque and impressive; his fight was spectacular. Mugford planned, prepared, and showed good judgment throughout. With great personal courage, he fought a brave and successful fight after securing results of real military value. Overcoming great odds, he inflicted casualties of 35 to 1. And yet, though his home city has given him a monument, he classifies merely as "a little-known hero of the Revolution."

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

DENTISTRY IN THE OLD NAVY

By SURGEON F. M. BOGAN, U. S. Navy

"Talking about pulling teeth," said a naval surgeon, "the most remarkable extraction I ever made was down on the Mosquito coast. I was on a gunboat which had taken down surveyors who were trying to find the best place for the Isthmian Canal. At San Blas the Indians were hostile, so our captain anchored there for awhile to protect the surveyors.

"The Indians used to come out in their canoes and remain all day gazing silently at the gunboat. They caught many fish and we could see chickens ashore, but we could not induce them to barter or sell anything. And I can tell you we would have given a good deal for a fresh egg or two.

"Our executive officer was a talented fellow who had a marvelous gift for acquiring languages. He used to stand by the rail for an hour or so each day and try to converse with the Indians in the canoes. At the end of a week he showed me a little book containing more than a hundred Indian words, and very soon he was able to carry on quite a conversation with them. Among other things he told them there was a great medicine man on board who could cure anything, and said how glad he would be to do anything for his friends, the Indians.

"It so happened that just at this time the big chief of the tribe ashore developed a toothache. After his medicine man had exhausted all his charms and the tooth kept on aching, the big chief, accompanied by all the male members of his tribe who could be crowded into canoes, came on board to be treated. I tried with the few dental instruments I had to extract the molar, but it was nothing but a snag and the forceps slipped off. Then I borrowed a mallet and wedge from "chips" and applying the wedge to the side of the tooth I struck the other end with the mallet and con-

tinued to drive the tooth back and forth until it was loose enough to remove with the forceps. During all this painful process the big chief never even grunted. When the tooth was out he passed it among his retainers with a pleased smile and then without comment the whole crowd left the ship.

"The next morning the chief came on board with six plantains and three eggs, a present for the great medicine man who had extracted his tooth. He also brought with him a single-barrel gun which when new might have cost as much as 90 cents. This gun had an impediment in its hammer action. The hammer came down half-way, then stopped, and after deliberating awhile completed the journey, but of course had not sufficient force to explode the cap. The big chief's line of reasoning no doubt was, the medicine man cured my tooth, let him now cure my gun."

U. S. NAVAL INSTITUTE

SECRETARY'S NOTES

Prize Essay 1918

The Secretary of the Navy disapproved, for the present, the publishing of the Prize Essay of 1918, subject, "Letters on Naval Tactics," by Lieutenant H. H. Frost, U. S. Navy. The Navy Department does not approve of the publishing of articles written by naval officers on the subjects of strategy and tactics during the continuance of the present war.

Prize Essays 1919

The attention of all the members and the subscribers to the U. S. NAVAL INSTITUTE PROCEEDINGS is invited to the new rules governing the Prize Essay contest for 1919 under the heading of Special Notice in this number. It is requested that authors who are writing or who contemplate writing essays submit them at their earliest convenience, as the Institute is in pressing need of articles for publication in the PROCEEDINGS.

Dues

It is requested that members who have not paid their 1918 dues of $2.50, do so at their earliest convenience.

Address of Members

Because of the fact that many copies of the PROCEEDINGS are being returned by the Postal Authorities, *all members are urged to keep the Secretary and Treasurer informed of the address to which* PROCEEDINGS *are to be sent, and thus insure their receipt.*

This precaution is now of particular importance as notices of changes of stations are not now available for the use of the Institute's staff.

Members and subscribers are urged to notify the Secretary and Treasurer promptly of the non-receipt of PROCEEDINGS, in order that tracers may be started. The issue is completed by the 20th of each month.

Membership Since December, 350 regular members, 25 associate members and 1 life member have joined the Institute.

Deaths:

Mr. George von L. Meyer.

Lieutenant E. W. F. Childs, U. S. Navy.

Resignations: One.

Book Announcements Attention is invited to the List of Book Publications for a complete catalogue of books revised and republished by the INSTITUTE.

The Landing Force Manual, U. S. Navy, 1917, is being compiled by a board of officers and will be ready for distribution shortly after the compilation has been completed, probably August 1, 1918.

The Manual of Wireless Telegraphy has been revised and is ready for distribution under the title "Robison's Manual of Radio Telegraphy and Telephony."

Navigation and Compass Deviations, by Lieut. Commander W. C. Muir, has been revised and is ready for distribution.

The Handy Book for the Enlisted Men of the Engineering Department is now in press and will be ready for issue about May 1, 1918.

Discount on Books The five per cent additional discount allowed to purchasers of books whose accounts during a calendar month amounted to a hundred dollars or over has been discontinued.

Book Department The Institute Book Department will supply any obtainable book, of any kind, at retail price, postage prepaid. The trouble saved the purchaser through having one source of supply for all books, should be considered. The cost will not be greater and sometimes less than when obtained from dealers.

Suggestions Invited Comment and suggestions relative to the make-up of the PROCEEDINGS are invited from all members interested in the welfare of the Institute. It is believed that the scope of usefulness of the PROCEEDINGS to members can be increased and all members are invited

to assist in this work. Should any topic, on which you think an article could well be written, occur to you, send it to the Secretary and Treasurer, together with such explanation or comment as may appear desirable in order that the intent of the suggestion may be clearly understood.

Reprints of Articles

The attention of authors of articles is called to the fact that the cost to them of reprints other than the usual number furnished, can be greatly reduced if the reprints are struck off while the article is in press. They are requested to notify the Secretary and Treasurer of the number of reprints desired when the article is submitted. Twenty copies of reprints are furnished authors free of charge.

Illustrations

Authors of articles submitted are urged to furnish with their manuscript any illustrations they may have in their possession for such articles. The Institute will gladly co-operate in obtaining such illustrations as may be suggested by authors.

Original photographs of objects and events which may be of interest to our readers are also desired, and members who have opportunities to obtain such photographs are requested to secure them for the Institute.

Notice

Whole Nos. 145, 146, 147, 149, 155 and 166 of the PROCEEDINGS (March, 1913, June, 1913, September, 1913, January-February, 1914, January-February, 1915, and November-December, 1916) are exhausted; there are so many calls for single copies of these numbers that the Institute offers to pay for copies thereof returned in good condition at the rate of 25 cents per copy.

ANNAPOLIS, MD., March 22, 1918.

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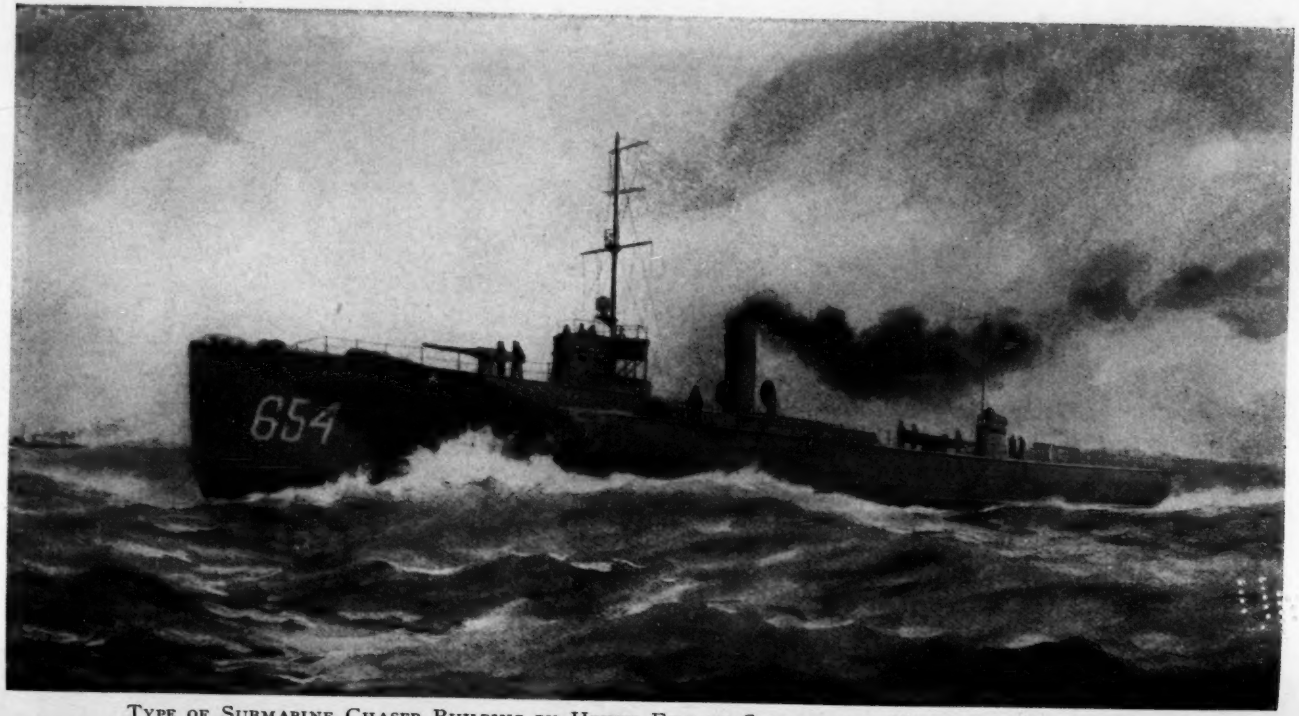

TYPE OF SUBMARINE CHASER BUILDING BY HENRY FORD BY STANDARDIZED METHODS OF FABRICATION.

PROFESSIONAL NOTES

PREPARED BY

LIEUTENANT W. B. JUPP, U. S. NAVY

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BRAZIL

SPIRITED ACTION OF BRAZIL.—Admiral Pronti has been appointed commander-in-chief of the Brazilian fleet to cooperate with the Allied fleet in European waters.

Commenting on correspondence which has passed between Senhor Nilo Peçanha, the Brazilian Foreign Minister, and Sir Arthur Peel, the British Minister, on the subject of Brazil's naval contribution to the war, the *Jornal do Commercio* says:

"It is the firm intention of Brazil to take part, on the one hand by sending airmen to England, and on the other by sending squadrons of cruisers and destroyers. Although modest, our contribution signifies much, and, if it is necessary, it will be augmented in accordance with our honor and the traditions of this people, which has never shirked the accomplishment of its great duties.—*Reuter.*"

The Brazilian Navy, which is for the most part, of British construction, consists of two battleships, five cruisers, two coast defence ships, four torpedo-gunboats, two gunboats, 10 destroyers, five torpedo-boats, submarines, and river monitors and gunboats. The battleships *São Paulo* and *Minas Geraes* were laid down in 1907, the first at Barrow and the second at Elswick, and have a speed of 21 knots. Their armament includes twelve 12-inch guns in pairs in turrets, and twenty-two 4.7-inch, and they have a displacement of 19,281 tons. Two of the protected cruisers—the *Bahia* and *Rio Grande do Sul,* both built in 1909 at the Elswick yards—are of 3100 tons. They developed a speed of 27 knots on their trials, and are armed with ten 4.7-inch guns. The *Barroso,* also Elswick-built, is of 3450 tons, has a speed of 20 knots, and carries six 6-inch, four 4.7-inch, ten 6-prs., and four 1-prs.; the *Tamandare,* constructed at Rio de Janeiro in 1890, is of

4537 tons, her speed is 17 knots, and her armament ten 6-inch, two 4.7-inch, and eight 1-prs.; and the *Benjamin Constant*, of French construction, is of 2707 tons, has a speed of 15 knots and carries four 6-inch, eight 4.7-inch, two 6-prs., and two 1-prs. The destroyers have a speed of over 27 knots.—*London Times*, 1/2.

BRAZIL TO COOPERATE WITH ALLIED NAVIES.—Admiral Pedro Pronti has been placed in charge of the Brazilian fleet which will cooperate with the Allies in European waters, according to a recent announcement.—*The Naval Monthly News.*

The Brazilian fleet which is to cooperate with the Allied fleet in European waters consists of two battleships, five cruisers, two coast defence ships, four torpedo-gunboats, two gunboats, ten destroyers, five torpedo-boats, submarines, and river monitors and gunboats.—*Army and Navy Gazette*, 9/2.

CHINA

ALIEN SHIPS AT SHANGHAI TURNED OVER FOR THE USE OF THE ALLIES.—Two German and Austrian ships which have been interned at Shanghai have been allotted to the United States, according to an unofficial dispatch on January 5 from Shanghai. They are the *Silesia* and the *China*. Of the other ships interned there, the *Bohemia, Albenga* and *Triumph* will go to Japan, the *Deike Rickmers* to Italy, the *Dathe* to France, and the *Sexta* and *Helene Richkmers* to Great Britain. The *Silesia* and the *China* are the largest, being 5174 and 6026 tons respectively.—*The Naval Monthly News.*

FRANCE

FRANCE REQUISITIONS HER MERCHANT MARINE.—A decree published in the *Journal Official* to-day provides for the requisitioning of the entire merchant marine of France on March 10.

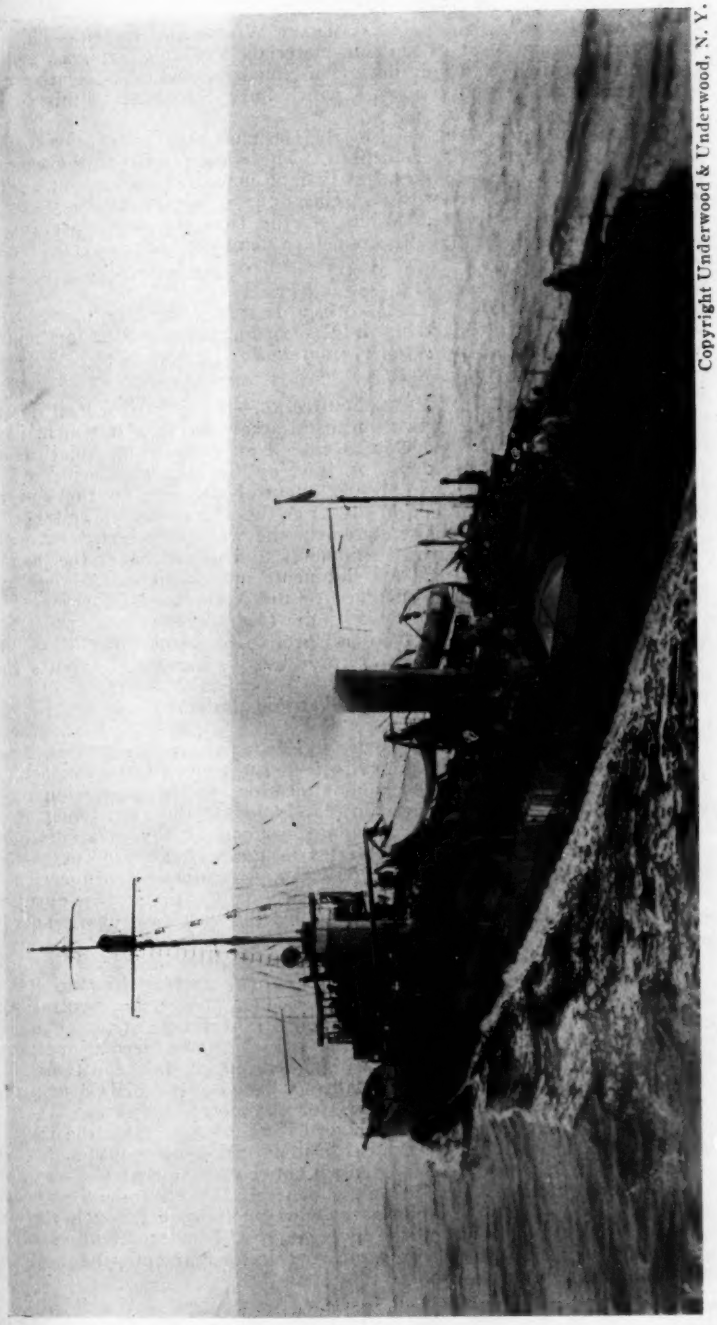
Government commissioners will confer with the shipowners as to the conditions under which the government will take over the vessels.—*Washington Evening Star*, 16/2.

FRENCH BUILDING MINE-SWEEPERS IN AMERICA.—Thirty-six mine-sweepers will be constructed for the French Government by the Foundation Company of Savannah, Ga. The ships will be completed in six months. They will be of steel, 150 feet long.—*The Naval Monthly News.*

FRENCH SHIPPING.—Authoritative statistics show that France had under her flag 2,498,286 gross tons of shipping at the outbreak of the war, 28 per cent of which up to September 1, 1917, or 699,948 tons, had been lost through war causes. To offset this 51,319 tons have been built in French yards and 134,978 tons have been purchased abroad. Outside the war losses, 52,000 gross tons have been erased from the register through causes aside from the war, making a total shrinkage of 751,048 and a net shrinkage of 564,851, which left under the tri-color on the date mentioned 1,983,535 tons.—*Marine Journal*, 9/3.

GERMANY

GERMANY WILL USE BLACK SEA SHIPPING.—Advices received from Berlin say that it was announced in the joint sitting of the Reichstag that it was intended to resume shipping in the Black Sea after the mines have been cleared away. The scheme is to expedite shipments to Germany from the Ukraine, Germany to supply agricultural machinery and implements in return for grain.—*N. Y. Herald*, 23/2.



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FRENCH TORPEDO-BOAT DESTROYER CRUISING AFTER GERMAN SUBMARINES. (NOTE RAISED DECK.)

GERMANS RUNNING SHORT OF AIRCRAFT WOODS AND CLOTH.—The Germans are running short of suitable materials for their airplanes and are using inferior timber and textiles. This important fact has been revealed by the captured German airplanes which have been sent to this country for study by aviation experts.

The materials now being used by the Germans are far inferior to those demanded by American specifications. The wing beams of the captured planes were made of thin pieces, less than an inch in thickness, put together with glue and nails. American specifications require solid beams of the finest and toughest spruce. Wings of the German planes are covered with a fiber cloth instead of the stout linen demanded here.—*N. Y. Herald*, 28/2.

DISORDERS IN GERMAN FLEET.—Fresh disorders have occurred in the German fleet off the Aland Islands, according to the Russian military newspaper, *Krasnaya Armia.—Washington Post*, 17/3.

HUN POLICY TO ATTACK NEUTRAL SHIPPING.—Sinking of neutral shipping by German submarines has two purposes, according to a statement issued by the war trade board. One is to cut off supplies from America, thus making the neutrals dependent for food on German good-will, and the other is a deliberate plan to destroy neutral shipping to the end that Germany may have advantage in the after-the-war struggle for trade.

Coincident with issue of the statement the war trade board announced regulations which are to govern shipments to Holland under the plan for seizure of the Dutch ships. All shipments not consigned to the Dutch Government itself must be consigned to the Netherlands Overseas Trust Company. Certificates obtained from the Overseas Trust by prospective importers must be forwarded to prospective exporters in this country, who, in turn, will apply to the war trade board's bureau of exports for a license.

The war trade board's statement regarding the sinking of neutral shipping is as follows:

"Germany's war leaders are using the submarine war weapon to prevent fulfillment of American agreements to feed and relieve European neutrals. A mass of cumulative evidence and indications in the possession of the war trade board show that Germany is employing the submarine menace to prevent neighbor neutrals receiving any food or favors at the hands of the United States and its associates in the war, and to coerce these neutrals, through starvation, into political and economic dependence upon Germany quite as much as to strike at the communications of its opponents —Germany's ostensible aim in proclaiming the ruthless submarine campaign.

"Further, indications tend to show that the submarines are being used, along similar dog-in-the-manger lines, to destroy neutral shipping without regard to its employment in order to weaken prospective neutral competitors after the war and to drag down neutral tonnage as far as possible toward a position of equality (or inferiority) with the German mercantile marine, which has lost between 40 and 50 per cent of its ocean tonnage, so that the neutral trader may be equally as badly off as his German rival for tonnage in the after-the-war race for commerce.

"No other interpretation can be placed, for example, upon the repeated instances of destruction of neutral Danish ships on voyages between Iceland and the Danish mother country, entirely outside of the war zone, nor upon the multitudinous 'mistakes' whereby Dutch and other neutral ships clinging to the precarious narrow way left open through the prohibited zone are torpedoed outside the zone by U-boat commanders, whose word that the vessels were within the zone is later accepted unquestioned by the German prize courts.

"Prominent shipowners in Scandinavian countries have stated their belief that many sinkings were inspired only by the intention to get rid of neutral tonnage so as to increase the relative value of German shipping available at the end of the war. Examinations of the captains of torpedoed ships before the marine courts in these countries bear out this belief, the testimony repeatedly showing that vessels were attacked far outside the zone.

"The intent of the Germans to prevent neutrals receiving food and supplies under relief agreements concluded with the United States is illustrated by the German veto placed upon the temporary *modus vivendi* with Holland, providing for the provisioning of that country. Two food ships loaded with supplies for the Netherlands along with 11 Belgian relief ships have been waiting in American ports for weeks unable to sail because of the refusal of Germany to permit an equivalent amount of tonnage leaving Dutch harbors, the obvious plan of the German authorities being to gather all Dutch ships into home harbors and then prevent any of them sailing, by threats to torpedo any vessel leaving Holland waters. To relieve the food situation in Holland the war trade board has finally authorized the transshipment of the food in question from the two Dutch steamers to the Holland liner *Nieue Amsterdam*, which is sailing shortly.

"The present campaign of threats and intimidation against the Scandinavian neutrals now carried on in the semi-official *North German Gazette* and other organs of the German press is obviously intended to frighten the northern neutrals from completing agreements which benefit the neutrals quite as much as the United States and its associates.

"Now, success of the earnest efforts of the United States Government to rush shipments of bread grain to Switzerland is threatened by the action of German submarines, which, according to now fully confirmed reports from Switzerland, have made a start on a new policy of ruthlessness by sinking the neutral Spanish steamer *Sardinero*, secured with great difficulty to carry food to that country. The torpedoing of the *Sardinero*, carrying nearly 4000 tons of cereals for Switzerland, can, by no stretch of the imagination, be brought within the scope of Germany's proclaimed submarine policy, since the vessel was engaged not in an enemy but in a supposedly safe trade for a neutral state, was en route to a port to which Germany had explicitly promised to leave open a safe passage and was torpedoed outside of the prohibited zone.

"To add to the deliberateness of the offence, the *Sardinero* was destroyed after the submarine commander had made a thorough examination of the ship's papers and convinced himself of the nature and destination of the cargo, so that no plea of a 'mistake' can be entered by Germany. The evident intent and result of the act was to prevent Switzerland, whose urgent and immediate need for food is well known to Germany, from receiving the American grain; to destroy a Spanish ship for after-the-war trade and to raise by this much the relative value and importance of each German ship afloat at the end of the war.

"By the Swiss-American agreement of December 5, the Allies guaranteed to Switzerland for its admittedly urgent needs an eight months' supply of 240,000 tons of cereals, subject to the assumption that Germany would safe-conduct the supply ships as specified in its proclamation on ruthless submarining, which provided a safe route to the Mediterranean port of Cette and promised that submarines would not molest such vessels. To accelerate delivery and provide for immediate necessities before grain from the Argentine, the natural source of supply, could reach Switzerland, the war trade board even procured from the scanty supplies in this country 30,000 tons of grain which had been earmarked for the Allies and allocated it to Switzerland, arranging to replace it later by grain from the Argentine, and had further proved its good faith and desire to help out dependent neutrals by successful efforts to secure tonnage to transport the grain.

"The plans even contemplated bringing the ships back in ballast from Cette to accelerate shipments and remove any pretext for German submarine interference with the ships, either going or coming.

"It is hoped that Switzerland and other neutrals will contrast the respective attitudes of Germany and the United States toward the problem of feeding the neutrals, and will take due notice of this latest attempt of Germany to intimidate neutral ship owners, through ruthless submarining, from carrying food to Switzerland. They will also note the same German spirit toward Holland, which Germany seems determined to prevent receiving food supplies, except upon German terms."—*Washington Evening Star*, 15/3.

GREAT BRITAIN

MUST DARKEN ALL SHIPS.—*British Admiralty Demands This Precaution Against Night Attacks.*—Vital importance is attached by the British Admiralty to the darkening ships, as explained by Sir Eric Geddes in his statement in the House of Commons last Tuesday. The Admiralty desires that the fullest possible publicity be given to the First Lord's remarks by placarding and otherwise. It urges that protective measures as prescribed be carried out immediately and implicitly.

Regarding the screening of lights on ships at night, Sir Eric Geddes, in his statement Tuesday, said:

"I am greatly concerned at the increased number of vessels lost at night, not only on moonlight nights, but on nights of complete darkness. Unless the ship is completely darkened in accordance with Admiralty orders night is no help against the submarine. In fact, the slightest visible light is an excellent target. I appeal to the shipowners and shipmasters to heed three points: First, obey instructions; second, keep a good lookout; third, thoroughly darken the ship."—*N. Y. Times*, 10/3.

Recently the British Government abandoned its policy of suppressing the figures in regard to Britain's shipbuilding output in 1917 and allowed Mr. Bonar Law to announce in the House of Commons that 1,163,474 tons of new ships had been turned out last year. This falls far short of the 1,900,000 tons which Lloyd George in August predicted would be launched. Lack of men and materials and changes in plans of vessels are given as the causes for this lessened output. Of the new tonnage built, 484,000 tons were constructed in the first half and 680,000 tons in the second half-year. Despite all the government's efforts at speeding up shipbuilding, therefore, gain in output during the last as compared with the first half-year was comparatively small. Nevertheless, merchant tonnage built in 1917 showed an immense advance over the meager totals of 688,000 and 538,000 tons attained in the two immediately preceding years, and clearly indicates that the British authorities are trying to atone for their past neglect of the shipbuilding industry. Undoubtedly, they were lulled into overlooking this important branch of national defence by the fact brought out by Lord Curzon that Great Britain was able to offset her losses in tonnage down to the close of 1916 by constructing new ships both at home and abroad, by purchasing vessels from foreign owners, and by confiscating enemy craft. Not until the start of Germany's ruthless submarine campaign did the British Government realize apparently the dependence of the nation upon ships.—*Nautical Gazette*, 21/2.

The principal reason heretofore advanced by the British Government for refusing to publish from week to week the names of vessels sunk by German submarines has been that the enemy would be materially aided if such information were given out. In allowing the total tonnage built in the United Kingdom and elsewhere in 1917 for British interests to be stated, however, those in authority have perhaps unwittingly revealed the extent of

the losses incurred last year by British shipowners as a result of U-boat depredations. Assuming Lord Curzon's assertion to be true that Britain's pre-war tonnage of 16,900,000 tons of ocean-going ships had suffered no impairment so late as the close of 1916, we know from a semi-official statement that this tonnage underwent a diminution of 2,750,000 tons in 1917. This represents losses by enemy action or otherwise less tonnage newly constructed or purchased. As Mr. Bonar Law has informed us, this last-mentioned tonnage amounts to 1,333,000 tons. Adding this newly constructed or purchased tonnage to the net loss incurred of 2,750,000 tons, a total of 4,083,000 tons results, which represents the losses suffered by the British mercantile marine from all causes in 1917. Probably U-boat sinkings make up nineteen-twentieths of these losses. Now that the British Government has itself let the cat out of the bag and divulged to the world the extent of the damage inflicted by enemy submarines on British shipping, no good ground exists for the Admiralty authorities persisting in their attempt to hide the tonnage sunk by the U-boats. Yet, even though its futility has been exposed, they continue to adhere to the policy of concealing losses.—*Nautical Gazette*, 19/2.

NORWAY.

SCANDINAVIAN SHIPPING LOSSES IN 1917.—As Norway, next to Great Britain, maintains the largest number of cargo carriers, and, during the war, has strictly preserved her neutrality as against Germany, the tale of her shipping losses is a lurid commentary on the policy of the power which professes to be promoting "the freedom of the seas." During the past year alone 401 of her seamen have been murdered on the high seas, while 258 are missing. Of ships, 434 have been sunk, representing a tonnage of 686,862 tons. Sweden, whose neutrality as regards Germany has been more or less benevolent, earned no particular consideration on that account, certainly not at sea. For, in 1917, 61 Swedish vessels were sunk by enemy submarines and 80 Swedish seamen drowned. As compared with Norway's totals Sweden's are small, but then she is nothing like so important as a maritime state. If, as Mr. Havelock Wilson says, Norwegian sailors are as determined as British seamen to bring retribution home to the enemy in peace terms, the compensation he will have to pay will be heavy.—*Army and Navy Gazette*, 2/2.

RUSSIA

RUSSIAN BALTIC FLEET DESERTED AT HELSINGFORS.—The whole Russian Baltic fleet is lying at Helsingfors, Finland, the Petrograd correspondent of the *Times* cables, but the crews have melted away, only a watch being left for each ship. The dreadnoughts will soon start for Kronstadt, but the remainder of the fleet will remain in Finland.

The correspondent also says that all movable articles from the cruisers *Aurora* and *Diana*, lying in the Neva River, on which Petrograd is situated, have been carried away by sailors.

The *Aurora* and the *Diana* are sister ships of 6731 tons displacement, built in 1896.

A Russian wireless statement has been received here signed by Tchitcherin, who for a time was held in prison in England for circulating seditious propaganda and later reported to have become Bolshevik Commissioner for Foreign Affairs. The message was addressed to the German, Austro-Hungarian, Bulgarian and Turkish governments, and read:

"In the Baltic the Russian transport ships *Russ*, *Nitava*, *Pallada*, *Merkury*, *Lakh*, *Okean*, *Biana* and *Zhulash* have been placed under the Red Cross flag and will be used exclusively in that service."

A dispatch to the *Exchange Telegraph* from Copenhagen, dated Monday, says:

"The Finnish Premier, Judge Svinhufvud, has arrived in Berlin, having made his escape from Helsingfors, where it is reported the Red Guards have

moved their headquarters to the Sveaborg fortress, indicating that they are unable to defend the capital.

"Mr. Lindhagen, the Mayor of Stockholm, who is in Helsingfors, reports that the Red Guards have rejected mediation by Sweden."—*N. Y. Herald*, 13/3.

BALTIC-BLACK SEA CANAL IS PROJECTED.—The commercial agreement between Germany and Russia will contain provisions for the construction of a canal which would form the connecting link of a waterway between the Baltic and the Black Sea, according to a Berlin dispatch to the *Politiken*. The cost is estimated at 20,000,000 marks and German financiers, it is said, are ready to provide the money.

[The foregoing apparently has reference to some scheme by which the rivers Dvina and Dnieper might be connected, forming a waterway from the Baltic through the Gulf of Riga to the Black Sea to the east of Odessa, cutting through the heart of western Russia and the Ukraine.]—*N. Y. Herald*, 13/3.

MAY MOVE CAPITAL EAST OF MOSCOW.—The Russian revolutionary government is prepared to move from Moscow to some point further east if the German armies continue to advance into Russia. A message to the State Department recently from Madden Summers, the American Consul at Moscow, dated March 8, said the government was expected there next day and that arrangements would be made to go to some other city if it became necessary.

A cablegram from Ambassador Francis at Vologda, which said nothing of any intention to move the American Embassy staff further east, apparently disposed of reports that the ambassador was preparing to leave there.—*N. Y. Herald*, 13/7.

UNITED STATES

BUILDING

"EAGLE" CLASS DESTROYERS.—Henry Ford is using his big plant at Detroit to build submarine chasers, and in almost incredible time he has promised that a big fleet of these boats will be ready to drive the German U-boat from the seas and make the seas safe for ocean traffic. Just how many are to be built is not announced but it has been intimated that the number is more than 200. In the same way the exact dimensions are not given by the Navy Department but, roughly, these boats will be between 150 feet and 200 feet in length and they will be nearer 200 feet than 150 feet. They are to be driven by steam turbine engines; steam will be generated in tubular boilers which will use oil as fuel. They are to make about 25 knots and their armament will consist of two 4-inch guns—one forward and one aft—and two anti-aircraft guns mounted in the waist of each vessel. They will be equipped with the most delicate microphones, which will tell the location of submarines. This instrument has been perfected by Thomas A. Edison.

These boats, with the 359 submarine chasers now completed, which are driven by two Standard engines, the original fleet of torpedo-boat destroyers which were built or authorized before the war began, and the hundreds of other destroyers which are being built as fast as possible in the largest shipyards, will make a formidable fleet which will play havoc with the submarines of the enemy and assure safe convoys to the many cargo boats that are to cross the Atlantic carrying supplies and munitions to the American Army in France and to the Allies.

Some months ago, William Gardner drew the plans of a submarine chaser or small destroyer which was submitted to the Navy Department. This vessel, about 150 feet in length, was very favorably commented on by

the naval expert designers and constructors, but the trouble was to get it built. It is understood that Mr. Gardner's designs furnished the scheme for the new boats and the department, after making some changes which would make the boats even more serviceable, suggested that a fleet should be built.

A story is circulating in naval circles which tells how Ford happened to be selected to build the boats. The plans had been accepted by the Naval Board but the construction chiefs were in despair.

"How can we build these boats?" they asked. "Every shipyard in the country has all the work it can handle. If we let the shipbuilders have contracts for these boats we will have to hold back work on the destroyers or else have a row with the Shipping Board to obtain some of their ships. We can't start new yards because we have not enough men in present yards to operate them properly."

While the naval officers were worrying, Henry Ford, who had heard about the new boats, came to their rescue. He offered to build the boats in his plant near Detroit. The naval men asked how he could do it without shipbuilders.

"Leave that to me," replied Mr. Ford, but not in so few words. The offer was accepted, the work began at once, and the first keel was laid in 20 days.—*Rudder*, March.

BIG U. S. SUBMARINE RENAMED.—The seagoing submarines of the American Navy will be numbered under a double letter system, it was announced recently at the Navy Department. The first of this type—the 1000-ton submersible *Schley*—has been renamed the *AA-1*, and a destroyer has been given the name of *Schley*.

The smaller submarines retain the single letter to denote the type, with the number attached to denote the individual boat. As new types are developed they will be given the additional letters of the alphabet. Large submarines succeeding the *AA-1* and differing from that vessel in type will be designated as the *BB* or *CC* or *DD* class. Some of the original *A* class of smaller submarines are still in operation in Philippnie waters.—*Washington Post*, 17/3.

FOUR NEW NAVAL DESTROYERS NAMED.—Four new naval destroyers have been named in honor of Rear Admirals Wilfiam Radford of Virginia, John B. Montgomery of New Jersey, Charles S. Boggs of New Jersey, and A. H. Kilty of Maryland, all of whom rendered distinguished service for the government.—*Evening Star*, 2/7.

PHILIPPINES TO BUILD NAVAL CRAFT.—Gov. Gen. Harrison has signed a bill authorizing the flotation in the United States of a $2,000,000 bond issue. The money will be used to finance the construction of the torpedo-boat *Rizal* and one submarine, to be given by the Philippines to help America in the war.

James J. Raferty, former director of internal revenue, has been sworn in as director of Bureau of Commerce, established by the last legislature. J. Trinidad has been appointed director of internal revenue. He is the first Filipino to occupy the post.—*Evening Star*, 23/2.

PLANNING FOR THE FUTURE.—The growth of the navy, furthermore, has just begun. The Navy Department is carrying out the largest warship construction program in history, which will embrace nearly 1000 vessels, including those of all types building or arranged for. Some months ago Secretary Daniels stated that we were building or had contracted for no less than 424 war vessels, in addition to the hundreds of submarine chasers of smaller type. Since that time, contracts have been given for more destroyers and a large number of the new type of steel submarine fighters Henry Ford is building at his Detroit plant. To provide for this immense expansion, Congress has made appropriations so gigantic that, with those now pending, the total will equal the entire amount expended on the navy from its birth in 1794 up to 1916.

These are but the barest facts, the mere outlines of a year of distinguished achievement, but they suffice to show why the American Navy has won anew the hearts of our nation. They are enough to explain these ringing words in the New York *Times:* "There has not been a reflection on the sea service since the state of war with Germany was declared, not even a suspicion of incompetence." Secretary Daniels said in his annual report: "Our navy has been called on to do much more than the public realizes, and in no case and in no way has it so far been found wanting either in matériel or personnel." These statements of fact show the power of a democracy to turn itself quickly to any necessary task, they show the effectiveness of the organization of the navy, and the ability of its Secretary, Mr. Daniels.—*Literary Digest,* 14/3.

GOVERNMENT POWDER PLANTS.—The navy is building two smokeless powder manufacturing plants of approximately $50,000,000 each, one at Nashville, Tenn., and the other at Charleston, W. Va., each capable of making 500,000 pounds of powder per day. The latter plant is to be constructed by the government, and the work already is under way. The Secretary of War has finally decided to take advantage of the valuable knowledge of those in charge of the Du Pont powder plant, and officials of the company will erect the plant at Nashville. The company will contribute its secret processes of manufacture and receive a flat payment of $500,000 and a further commission of 3 per cent of the total cost, the total fee not to exceed $2,000,000. The Du Pont people will operate the plant for at least six months and, during operation, will receive 3½ cents per pound for all powder manufactured, with a bonus for reduction in cost of production. It is announced that the plants will be in operation in August of this year. On January 10, Secretary Baker told the Senate committee on military affairs that the Du Pont people had offered to construct the government powder factory last October, but he objected to the high cost of supervision, although the final offer of the company was to go ahead with the work and leave the question of remuneration to arrangement.—*Army and Navy Register,* 2/3.

POLICY.

COMMAND OF U. S. DESTROYER FORCE ABROAD.—Contrary to the almost universal supposition in this country, the American destroyers operating in British waters are not under the immediate command of an American naval officer, but under an officer of the British Navy, Admiral Sir Lewis Bayly, K. C. B., C. V. O., the local commander of the section where the destroyers make their headquarters.

While Vice Admiral William S. Sims has jurisdiction over all American warships operating in European waters, including those engaged in combating the enemy submarines, he and his staff are located in London, where he performs duties more in the nature of a representative of the chief of naval operations at our Navy Department.

Navy officers here are much dissatisfied and, to some extent, humiliated because an American naval officer has not been placed in immediate command of the destroyers abroad. At first the number of our destroyers there operating was small, and it was logical that they should work under the British destroyer organization. Now that our fleet of this and other small classes there has reached considerable proportions and includes some of our latest and best destroyers, our navy officers here feel that the time has arrived when the fleet should be operated under an American naval officer of flag rank. However, the condition has developed not so much as a result of intention on the part of the British authorities as from inaction on the part of our Navy Department in failing to initiate proceedings that would lead to a change. Doubtlessly the matter will be taken up sooner or later and one of our flag officers assigned to duty as immediate commander of the American destroyers in British waters.—*Washington Post,* 17/3.

CONTROL OF FOREIGN COMMERCE TO CONSERVE SHIPPING.—The President's order putting all our foreign commerce under control by license will be only another evidence both to our enemies and ourselves that we are showing a progressive willingness to go the limit for the successful prosecution of the war. Our military and naval preparations, our huge bond issues, our loans to our allies, the very general conscription of industry, the nationalization of the railroads, our individual and collective eagerness to save food for the benefit of England, France, and Italy, all prove how deeply we are committed to the conflict against German autocracy. This last step taken by the President is only the logical development of the concentration of all our forces in winning the war. Commerce not essential to this purpose, which uses tonnage necessary for transportation of troops, munitions, and food across the Atlantic, will simply not be licensed by the President. Our allies have long ago adopted this latest plan. Gradually a parity of war conditions is being established among all the Allies.—*Nautical Gazette*, 21/2.

U. S. COMPETING FOR SEA SUPREMACY.—London *Fairplay* is very apprehensive of British shipping supremacy, due to the U. S. emergency fleet, which, when off the ways, will consist of an enormous mass of tonnage, all of the tramp type, that is an undoubted menace to the old time idea that Great Britain is mistress of the seas, as this will mean that the United States will be in the position of becoming a formidable competitor. The writer in *Fairplay* says: "If pre-war conditions are allowed to prevail, not only will American cargo vessels be able to shift from, say, San Francisco to New York with cargo—whereas British vessels will only be allowed to go in ballast—but they will also be able to trade between British ports on absolutely equal terms with British craft. To the extent shown, American tonnage therefore will, after the war—if things continue as they were—be in a distinctly more favorable position commercially than British.—*Marine Journal*, 9/3.

RULING MADE TO INSURE THAT ALL SHIPS BUILT IN U. S. YARDS SHALL FLY THE AMERICAN FLAG.—Action has been taken by the war trade board, in cooperation with the United States Shipping Board, to insure that all vessels turned out under the shipbuilding program, or otherwise, shall be registered as American vessels and thereby kept under the control of the United States Government.

In order to effect this, a ruling has been adopted by the war trade board, which will be incorporated as Paragraph VI in General Rules No. 1, Governing the Granting of Licenses for Bunker Fuel, Port, Sea, and Ship's Stores and Supplies, and which reads as follows:

"No application for bunkers by any vessel built in the United States and completed after February 1, 1918, shall be granted, unless the vessel is documented under the American flag or unless the United States Shipping Board shall have waived such documentation."

Clause (o) of Paragraph V of the General Rules No. 1 above referred to, as amended February 5, 1918, provides that no neutral or uncommandeered American vessel shall be bought or sold without the previous approval of the United States Shipping Board, the war trade board, or the interallied chartering executive.

In the application of this clause (o) the war trade board has issued the following announcement of the principles which will guide their action in the administration of this paragraph, which is to the following effect:

"That applications for permission to buy or sell the vessels mentioned in clause (o) of Paragraph V should be made in the first instance to the United States Shipping Board, and that the war trade board would ge governed by the decision of the United States Shipping Board upon such application."

For the further guidance of applicants for permission to buy or sell vessels under Section (o), the following rules of the shipping board have been issued:

Applications to the shipping board for permission to buy or sell vessels under Section (o) of Paragraph V of the war trade board's General Rules No. 1 should include the following information:

1. Name of vessel.
2. Official number.
3. Date of construction.
4. Type of vessel.
5. Gross tonnage.
6. Deadweight capacity.
7. Speed.
8. Name of purchaser.

—*Official Bulletin, 23/2.*

THE NAVY AND SHIPPING CONTROL.—For the purpose of establishing liaison between the navy and the shipping-control committee at the port of New York and such other ports as may be necessary, a naval officer representing the overseas operating division of the bureau of operations, Navy Department, will be assigned to that office. All matters relating to naval personnel operating cargo or other vessels will be handled directly with the representative of the overseas bureau of operations, Navy Department. On all matters pertaining to troop convoys, or in connection with matters which arise between the army and navy in the operation of troop ships, liaison will be established through the naval aids on the staffs of the commanding general, port of embarkation, and the details necessary in these operations will be handled directly between the commanding generals of the several ports of embarkation and the commander of the cruiser force. The executive office of the shipping-control committee will be established at 45 Broadway, and in order to expedite the transaction of government business all personnel assigned directly to the performance of the duties of the shipping-control committee will be located in the same building or buildings adjacent thereto. Offices at other ports of embarkation will be selected and determined upon by representatives of the shipping-control committee and the commanding generals or depot quartermasters of expeditionary depots at the several ports.—*Army and Navy Register, 9/3.*

PERSONNEL

NAVAL PERSONNEL INCREASE.—If the naval appropriation bill, so far as it pertains to naval personnel, is enacted as drafted by the House Naval Committee, the authorized enlisted strength of the navy will be raised to 228,000 men from the present combined permanent and temporary strength of 150,000, as recommended by the chief of the Bureau of Navigation.

The bill as drafted also contains some other legislation affecting the personnel. It is provided, among other things, that the naval militia be transferred to the naval reserve force, thus simplifying matters by having one class of temporary personnel.

The bill also places the chief of naval operations on the same basis as to pay and allowances as the chief of staff of the army, with whom he has the same relative rank and corresponding duties. This change was recommended to the committee, because it was not seen why the chief of naval operations should be discriminated against in the matter of pay and allowances.

The bill contains a clause, recommended from sources in the Navy Department, providing that the chief of the department bureaus and the judge advocate general of the navy shall have the rank, pay and allowances of rear admirals of the upper half, and thus placing them on the same basis as the War Department bureau chiefs. The judge advocate general now has the rank of captain, and some of the bureau chiefs the rank of rear admirals of the lower half, corresponding as to pay and allowances to those of brigadier generals in the army, while others already have the rank, etc., of rear admirals of the upper half.

It is understood that the recommendation that those holding temporarily the ranks of admiral and vice admiral by virtue of special assignments, as, for example, chief of naval operations, commanders-in-chief of fleets, and second in command, shall have the higher rank, but the pay of rear admirals, when placed on the retired list, was not embodied by the committee in the bill. Under the present law those holding the higher rank return to the grade of rear admirals.—*Washington Post*, 17/3.

INCREASE OF MARINE CORPS.—As drafted by the House Naval Committee, the naval appropriation bill, which is nearing completion in that committee, authorizes a further temporary increase of the marine corps by 20,000 men, making the total combined temporary and permanent allowance 50,000 men.

This increase will not be sufficient to enable the corps to raise its present representation of a brigade in France to a complete division, including the special troops such a tactical unit requires, as the minimum estimates to enable that to be done are for a marine corps of 71,344 men.

Naturally, the marines are disappointed that provision is not made for the larger number, and it is understood that some members of the committee are in favor of a greater increase and will seek to have it inserted in the bill on the floor of the House. It is uncertain, of course, whether this will be done, but the sentiment in Congress is so favorable to the marine corps that it is practically certain that at least the increase of 20,000 men recommended by a majority of the House committee will be authorized.

As the marines are employed largely in comparatively small detachments, it was not thought necessary to provide for the temporary force the same proportion of officers of the higher grades as allowed for the permanent personnel. Therefore, the law that restricts temporary appointments based on temporary strength to the grades of major and below was not repealed, but appointment of some additional officers of higher grades was allowed, in order that they might be available for the organization of additional regiments and higher units. This allowance is one additional permanent major general, and as temporary officers three brigadier generals, 12 colonels and 12 lieutenant colonels, in addition to the numbers now allowed those grades.—*Washington Post*, 17/3.

NAVY'S COMPLEMENT FILLED.—The enlisted strength of the regular navy still remains filled, and it has been necessary to continue a limited quota of enlistments to 1000 a week throughout the country. This restriction was imposed upon the navy recruiting service early in January, when the maximum strength was reached. There are approximately 192,000 men in the regular service and about 79,000 men enrolled in enlisted ratings of the naval reserve force, which branch, however, has no limit of strength fixed by law. The transfer of recruits from their homes has been resumed, and men are being sent to the eastern rendezvous in lots of 400 and 500 at a time. The training stations are still well filled, but are not overcrowded.—*Army and Navy Register*, 16/3.

TRAINING NAVAL RESERVE.—Steady increases of the various classes comprising the naval reserve force have rendered necessary additional facilities for training the personnel. In furtherance of the plan of the naval officials to enroll undergraduate students of technical universities, as described recently in these columns, steps have been taken to establish a course of instruction for junior engineer officers at Stevens Institute, Hoboken, N. J. This course will specialize in steam engineering, as distinguished from the training in gas engines which has been conducted at Columbia University, New York City, for engineers of motor-boats. As the requirements are much greater for junior engineer officers in steam vessels, the class will consequently be more extensive. Gasoline-driven craft being smaller, only a limited number of engineer officers was needed, and the demand was readily met. It is the policy, for the present at least, not to interfere with

the completion of the college course of technical students who enroll in the naval reserve force, but to permit them to continue at school or university until they graduate. The training camp and school at Pelham Bay has already developed into a small city, under the supervision of Commander W. B. Franklin, N. R. F., and plans have been prepared for the further enlargement of the school to a capacity of 16,000 reservists. These men will comprise the personnel for manning the merchant vessels as they are brought under the navy. The training school is divided into two parts—the instruction of recruits in seaman and petty officer ratings in the naval reserve and the selection and the preliminary instruction of young men as officer material—for a further course either at the officers' training school or at the reserve school at the Naval Academy, Annapolis. A still further camp is under construction at Detroit, Mich., for the accommodation of some 5000 reservists who will constitute the crews for the Ford motorboats as they are built. This camp will be more in the nature of a receiving station for men selected to man these boats, although there will be a special course of training for the engineers' force, enabling the men to become familiar with the mechanism while the vessels are under construction.—*Army and Navy Register*, 2/3.

OFFICERS FOR NAVAL RESERVE.—An "Officers' Material School" for the naval auxiliary reserve has been established at the naval training camp, Pelham Bay, New York City, which at present is graduating deck officers at the rate of 100 to 150 a month for service in auxiliary naval vessels. It is intended to increase the output of this school to 200 a month, and to carry out this purpose the naval districts first to fifteenth, inclusive (along the North Atlantic coast), have been directed to transfer a weekly quota of men aggregating 25 each week beginning on March 12, to the superintendent of the auxiliary naval reserve, Municipal Ferry Terminal, New York City. These men will be assigned by the superintendent to such coastwise vessels as are available, and if their work on those vessels proves satisfactory at the end of two months' sea training, they will then be ordered to the officers' material school at Pelham Bay Park. Those who are found unsatisfactory will be given suitable ratings and transferred to the training camp at Pelham for general detail. The candidates must be men of ability and officer material, between 21 and 30, with education equivalent to a completed high-school course, physically qualified according to regular navy standards, and shall have had at least one month's military training or its equivalent. They may belong to the regular navy, national naval volunteers, or any class of the naval reserve force enrolled for general service. A similar school will be maintained at Municipal Pier, Chicago, under the commandant, ninth naval district, for the preparation of men for the officers' material school at Pelham. A similar school, for the training of engineer officers for the naval auxiliary reserve, will be established for the purpose of graduating 100 officers for steam engineering duties each month, beginning August 1. The training course will be four months in length, the first month being spent at Stevens Institute, Hoboken, where the preliminary instruction in boilers, engines, and auxiliaries will be given; two months' practical work will follow on coastwise ships, sound and river steamers, tugs, ferries, and at the different repair plants in the vicinity of New York. The fourth month will be spent in final training in organization, routine, care and upkeep, repairs, and the duties of engineer officers at Stevens Institute. A quota of 25 men each week has been allotted, beginning March 27. Candidates for this course must have the same general qualifications as those fixed for deck officers.—*Army and Navy Register*, 9/3.

TWENTY-THREE NEW VESSELS OUTPUT FOR MARCH.—The United States Shipping Board has made public the following:

Fifteen steel vessels, aggregating 114,100 tons, were completed and delivered in American shipyards in February for the Emergency Fleet Corporation. It is expected that in March the total number will be increased to 23 vessels, of an aggregate tonnage of 188,275.

Some of the ships included in the March schedule already have been completed.

The following table shows the February record of vessels completed and delivered:

Description	Tonnage	Date of completion
Cargo vessel	8,800	Feb. 12
Do.	8,800	Feb. 4
Do.	9,400	Feb. 4
Do.	8,800	Feb. 4
Do.	10,000	Feb. 3
Do.	6,000	Feb. 6
Tanker	14,900	Feb. 14
Collier	8,600	Feb. 15
Cargo vessel	8,800	Feb. 22
Do.	8,800	Feb. 26
Do.	8,800	Feb. 16
Do.	3,100	Feb. 14
Do.	3,100	Feb. 14
Do.	3,100	Feb. 25
Do.	3,100	Feb. 27
Total	114,100	

The estimated deliveries for March are shown in the following table:

Description	Tonnage	Date of completion
Tanker[1]	10,475	Feb. 28
Cargo vessel	8,800	Mar. 4
Do.	3,300	Mar. 6
Do.	4,500	Mar. 1
Do.	7,500	Mar. 1
Tanker	7,000	Mar. 7
Do.	10,475	Mar. 4
Cargo vessel	8,800	Mar. 9
Do.	7,500	Mar. 10
Do.	6,200	Mar. 11
Tanker	12,650	Mar. 15
Cargo vessel	8,800	Mar. 15
Collier	8,600	Mar. 15
Tanker	10,300	Mar. 15
Cargo vessel	8,800	Mar. 15
Do.	8,800	Mar. 17
Collier	4,900	Mar. 20
Cargo vessel	10,500	Mar. 25
Do.	3,300	Mar. 25
Tanker	9,000	Mar. 27
Cargo vessel	8,800	Mar. 30
Do.	8,800	Mar. 30
Tanker	10,475	Mar. 31
Total	188,275	

[1] Accepted March 1.

—*Official Bulletin*, 15/3.

U. S. MERCHANT MARINE

NUMBER, TYPE AND TONNAGE OF VESSELS REQUISITIONED OR UNDER CONTRACT FOR UNITED STATES SHIPPING BOARD.—The United States Shipping Board authorizes publication of the following table showing the number, type, and tonnage of the vessels which have been requisitioned or are under contract for construction:

Number, type, and deadweight tonnage of vessels under contract or requisitioned by the Emergency Fleet Corporation, segregated as to wood, steel, composite, and concrete.

Type of vessels	Vessels under contract									
	Total		Wood		Steel		Composite		Concrete	
	No. of vessels	Deadweight tonnage	No. of vessels	Deadweight tonnage	No. of vessels	Deadweight tonnage	No. of vessels	Deadweight tonnage	No. of vessels	Deadweight tonnage
Cargo:										
2,500	1	2,500	1	2,500	.....	.....	.....	.....	.....	.....
3,000	1	3,000	.....	.....	.....	.....	.....	.....	1	3,000
3,500	457	1,599,500	381	1,333,500	24	84,000	50	175,000	2	7,000
4,000 and under	37	147,650	29	115,650	.....	.....	8	32,000	.....	.....
4,500 and under	6	27,000	6	27,000	.....	.....	.....	.....	.....	.....
4,700	12	56,400	12	56,400	.....	.....	.....	.....	.....	.....
5,000 and under	220	1,022,700	.....	.....	220	1,022,700	.....	.....	.....	.....
6,000 and under	13	74,100	.....	.....	13	74,100	.....	.....	.....	.....
7,500 and under	76	569,600	.....	.....	76	569,600	.....	.....	.....	.....
8,800 and under	98	862,400	.....	.....	98	862,400	.....	.....	.....	.....
9,000	80	720,000	.....	.....	80	720,000	.....	.....	.....	.....
10,000 and under	86	814,800	.....	.....	86	814,800	.....	.....	.....	.....
12,000 and under	16	170,900	.....	.....	16	171,900	.....	.....	.....	.....
Total	1,103	6,070,550	429	1,535,050	613	4,318,500	58	207,000	3	10,000
Cargo and transports:										
8,000	70	560,000	.....	.....	70	560,000	.....	.....	.....	.....
10,000	5	50,000	.....	.....	5	50,000	.....	.....	.....	.....
Total	75	610,000	.....	.....	75	610,000	.....	.....	.....	.....
Tankers:										
7,500	3	22,500	.....	.....	3	22,500	.....	.....	.....	.....
10,000 and under	9	87,300	.....	.....	9	87,300	.....	.....	.....	.....

Type of vessels	Vessels under requisition			
	Total		Steel	
	No. of vessels	Deadweight tonnage	No. of vessels	Deadweight tonnage
Colliers:				
5,000 and under	3	14,700	3	14,700
9,000 and under	4	34,400	4	34,400
Total	7	49,100	7	49,100
Passenger and cargo:				
5,000 and under	4	18,972	4	18,972
6,000 and under	2	10,600	2	10,600
Total	6	29,572	6	29,572
Tankers:				
5,000 and under	2	8,900	2	8,900
7,500 and under	7	49,300	7	46,300
8,800 and under	3	24,880	3	24,880
9,000 and under	7	63,000	7	63,000
10,000 and under	12	115,400	12	115,400
12,500 and under	15	161,295	15	161,295
12,650 and under	1	12,650	1	12,650
Total	47	435,425	47	435,425
Cargo:				
3,500 and under	82	267,280	82	267,280

10,000	5	50,000			5	50,000				
Total	75	610,000			75	610,000				

12,650 and under	1	12,650			1	12,650				
Total	47	435,425			47	435,425				

Tankers:										
7,500	3	22,500			3	22,500				
10,000 and under	9	87,300			9	87,300				
10,100	15	151,500			15	151,500				
Total	27	261,300			27	261,300				
Tug boats	20		14		6					
Grand total	1,225	6,941,850	443	1,535,050	721	5,189,800	58	207,000	3	10,000
Grand total requisitioned and under contract	1,557	9,260,017	443	1,535,050	1,053	7,507,967	58	207,000	3	10,000

Cargo:				
3,500 and under	82	267,280	82	267,280
5,000 and under	35	155,100	35	155,100
6,000 and under	2	11,000	2	11,000
7,500 and under	29	212,500	29	212,500
8,000 and under	2	16,000	2	16,000
8,800 and under	48	420,200	48	420,200
9,000 and under	14	126,000	14	126,000
10,000 and under	19	184,840	19	184,840
12,500 and under	24	286,450	24	286,450
15,001 and under	2	28,000	2	28,000
Total	257	1,707,370	257	1,707,370
Refrigerators:				
7,500 and under	12	77,700	12	77,700
10,000 and under	1	10,000	1	10,000
Total	13	87,700	13	87,700
Transports:				
5,000 and under	2	9,000	2	9,000
Grand total	332	2,318,167	332	2,318,167

Requisitioned vessels completed and accepted or reconveyed

Type of vessels	Number of vessels	Dead-weight tonnage
Colliers:		
8,600 tons	1	8,600
12,650 tons	1	12,650
Total	2	21,250
Ore carriers:		
6,000 tons	1	6,000
11,300 tons	4	45,200
17,060 tons	1	17,000
Total	6	68,260
Passenger and cargo:		
4,986 tons	1	4,986
Tankers:		
8,000 tons	1	4,000
8,500 tons	2	16,630
9,000 tons	2	18,000
Tankers—Continued:		
10,475 tons and under	4	41,725
14,900 tons and under	5	72,150
Total	14	153,505
Cargo:		
3,500 tons and under	26	82,520
4,500 tons and under	7	28,700
6,000 tons and under	4	22,500
7,500 tons and under	8	57,960
8,800 tons and under	14	123,200
10,000 tons and under	7	67,860
12,500 tons	3	37,500
13,000 tons	1	13,000
Total	70	433,240
Grand total	93	681,241

Vessels contracted for and requisitioned

Character of Vessels	Number of vessels	Total dead-weight capacity
Wood	443	1,535,050
Steel	[1] 723	5,207,400
Composite	58	207,000
Concrete	3	10,000
Total contracted	1,227	6,959,450
Total requisitioned (all steel)	[2] 425	2,999,408
Grand total	1,652	9,958,858

[1] This total includes 2 vessels of 8,800 tons each, completed and accepted.

[2] This total includes 93 vessels of 681,241 tons which have been completed and accepted or reconveyed to original owner.

Prepared by the statistical department in the executive and administrative division.

MARCH 12, 1918.

RODMAN'S NECK TRAINING STATION.—On Rodman's Neck, which juts out into what is known as Eastchester Bay, near City Island, there is a naval city concerning which persons in New York know little, despite the fact that it is within the city limits and that it is to-day one of the best equipped naval training plants in the United States, where more than 5000 boys, most of them from colleges and universities, are undergoing intensive training for service on the submarine chasers which are destined to play a big part in fighting the German submarines. The naval cantonment where these boys, who come from every state in the Union, are being whipped into shape to play their part in the war, is officially known as the Naval Reserve Training Station of the United States, and so great has been the success of the experiment that the Navy Department has decided to triple its capacity, so as to make possible the accommodation of 16,000 men. Work of enlarging the plant will be immediately started.

A little more than six months ago Rodman's Neck was an uninhabited tract of land, part of it wooded and part of it sandy beach. Its only use was as a picnic ground for New York school children and a camping site for the week-end fisherman. To-day it is a compact, well-ordered, healthy little city of more than 6000 people, most of them boys between the ages of 19 and 21 years of age. The man who commands the city is Commander W. B. Franklin, U. S. N., through whose courtesy a *Times* reporter was permitted yesterday to inspect the station.—*N. Y. Times*, 24/2.

MISCELLANEOUS

SIX INJURED IN EXPLOSION ON BOARD THE "MONTANA."—One man was fatally injured, two seriously and five slightly hurt in the explosion of a cartridge case on board the armored cruiser *Montana*, the Navy Department announced. Boatswain Mate Charles W. Pauly, No. 221 West Thirty-third Place, Chicago, Ill., died while being taken to a hospital.

Seamen Roy L. Putnam, Phoenix, Ala., and Lawrence H. Finley, Cawker City, Kan., were seriously hurt.

The slightly injured were: Private Richard H. Guion, Marine Corps, New Orleans, La.; Seamen William T. Friederichs, Chippewa Falls, Wis.; Charles E. Pyle, Lamar, Col.; John H. Atterson, Salmons, Ky., and H. T. Leroy, home address not given. No details of the explosion were announced.—*N. Y. Herald*, 21/2.

EIGHT HURT BY ACCIDENT ABOARD CRUISER "MONTANA."—Eight men have been injured in an explosion of a cartridge case during target practice on the cruiser *Montana*.

A brief report to the Navy Department carried no details of the accident and did not give the names of the men hurt.

Official denial was issued by the department of recent reports of an explosion on board the battleship *Utah*. The death of Lieut. Commander Baush, which gave rise to the rumor, was caused by falling down a coal hatch.—*Washington Evening Star*, 19/2.

U. S. ARMY

THE NEXT DRAFT.—[From the office of the Provost Marshal General.] There has been a great deal of speculation in the press concerning what has been termed "the date of the next draft." Almost every week, announcements have been made, and these announcements, being mere guesses, have resulted in an unrest and uncertainty that has been unfortunate.

As a matter of fact the state of preparedness of the army to assimilate recruits varies from day to day and from week to week, and the most scientific manner of recruiting the forces will be to withdraw them from civil life as fast as they can be assimilated by the army, and no faster.

According to this plan, men will be inducted into the service in very small groups apportioned among the various states from week to week or from month to month as they are needed. In order to distribute the burden equally over the various states, however, it is necessary to make arithmetical computations of the share of each state, and it is not practicable to make these computations for such small numbers. For mere bookkeeping facility, therefore, it is necessary to assume a total of considerable size, and to apportion it among the several states as their immediate burden. This total is called a national quota, and the various shares are called state quotas. The announcement of the quota does not mean that any such great number of men will be called to military service at once, and, indeed, has no necessary relation to the date of call for the reason that a constantly changing situation causes changes in the number of men who are to be called to the colors.

It is unwise to attempt to make a forecast of the number of men that will be called for immediate military service in advance of the development of the whole complex problem of supply and transportation. It is also unwise to make public announcements of specific figures which might serve the enemy as a precise basis for determining the plans for military participation of the nation in this war. It is necessary, however, to compose the present unrest and uncertainty by some public announcement, and for this reason the following is authoritatively stated:

The next national quota will be announced and apportioned among the several states as soon as pending legislation authorizing a change in the basis of computation is enacted by Congress. This legislation has been passed by the Senate and favorably reported by the House Military Committee. The number that will be assumed as a basis for computation will be 800,000, which is well within the authorization of Clause 4 of Section 1 of the Selective Service Act of a second increment of 500,000 men, increased by the recruit training units authorized by Clause 5 of said Section 1, and by the special and technical troops authorized by Section 2 of said act. It cannot now be announced what the total number to be called to the colors each month will be, but it is stated that no more men will be called than can be properly accommodated and promptly assimilated.—*Army and Navy Register*, 16/3.

THE ARMY IN FRANCE.—In support of his statement that the prospects were not unfavorable for putting 1,500,000 American soldiers in Europe this year, Secretary of War Baker submitted certain confidential tonnage figures to the Senate Committee on Military Affairs. According to his data, 2 tons gross or 1.6 tons net of shipping per man are needed to maintain our army on the other side. The War Department also estimates that an army in the field requires 50 pounds a day a man of supplies of all kinds, including food, clothing, and munitions, which many authorities consider entirely too low. On the 50 pounds a day basis, however, it would take more than 9 tons of supplies a man per year, or an aggregate of 13,500,000 tons of supplies, to maintain an army of 1,500,000 men for one year in France. If all vessels could be loaded to capacity, and the number of round trips which they could make to Europe in a given time were known, it would be an easy matter to calculate how much shipping would be required to keep 1,500,000 American soldiers properly supplied in Europe. But it is a matter of record that ships transporting supplies to France are only carrying part of their maximum tonnage capacity because the supplies sent over are of such a nature that they cannot be often packed closely enough to load a vessel to its full carrying capacity. Then again, all sorts of delays are incurred in the making of a round trip. The amount of tonnage required to supply a given number of troops in Europe cannot under present conditions, therefore, be estimated with any degree of accuracy. As American tonnage now available is only 1,400,000 tons, existing shipping facilities are clearly inadequate to maintain 1,500,000 soldiers. Secretary Baker is counting on securing

more allied vessels, and his getting 1,500,000 men to Europe this year will depend largely on the amount of tonnage placed at his disposal by our European allies.—*Nautical Gazette*, 21/2.

TO SPEND $300,000,000 ON CONSTRUCTION WORK.—Approximately $300,000,000 worth of construction will be done for the War Department this year under the direction of the emergency construction division of the war industries board.

The program this year calls for the building of six great terminal and storage areas at Atlantic coast ports, approximately 31 interior or accumulation storage areas, and perhaps six gas and powder plants in addition to the two big powder factories already authorized at Nashville, Tenn., and Charleston, W. Va.

All the contracts have been made under the cost and percentage arrangement, with close supervision by government experts.

The old maximum of 10 per cent profit on contracts running up to $100,000 has been replaced by 7 per cent in the new contracts, which follow a finely graded scale of 6½ per cent between $100,000 and $500,000, 6 per cent between $500,000 and $1,000,000 to the minimum of 2½ per cent on contracts of $10,000,000. The old contracts allowed 8 per cent between $100,000 and $250,000 and then 7 per cent up to $3,000,000.

As the bulk of the contracts called for expenditures varying from $1,500,000 to $3,000,000, the board decided that the graduations of the old percentages were not adjusted equitably.

Both forms of contracts set a maximum of $250,000 profit on any one contract. The new contracts limit profit on subcontracts to 2½ per cent, regardless of the rate paid on the body of the work.—*Washington Evening Star*, 13/3.

FIVE HUNDRED THOUSAND TROOPS IN FIRST ARMY ON AMERICAN FRONT.—*Force to be Completed at Once for Three Corps of Six Divisions Each.*—Based upon the three line method of trench warfare evolved in France, the War Department, it was learned, has approved a system of organization which fixes six divisions as the strength of an army corps.

Three or more corps will constitute a field army and the immediate purpose of the department is to complete the organization of the first field army in France in the shortest possible time to give General Pershing the strength to hold a fully "Americanized" sector of the front. The scheme leaves to General Pershing the determination of the number of corps and the number of field armies needed, and also authorizes him to recommend commanders for the higher units.

By the six division army corps system each corps will occupy a front sector with two divisions, while two replacement or reinforcement lines of two divisions each will back them up. The effect is to produce the line of depth necessary for the type of warfare now in progress.

Only Seasoned Men in First Line.—Replacement troops sent from the United States are fed into the war machine in France at the third line. They move forward in regular order as their training progresses and arrive at front line trenches to fill in casualty gaps only when they have been thoroughly seasoned.

To fulfill the functions of an army corps it has been found necessary to place under a corps commander, in addition to his six infantry divisions, approximately 30,000 men, known as corps troops. These comprise artillery units, engineers and all types of service battalions for work on the communication lines of their own corps. A similar organization of about 130,000 men is necessary for each field army of three corps. These field army troops maintain the lines from the advance base of the army back to the sources of supply. In the case of General Pershing's forces this line connects with the ocean transport service.

Included in the corps troops are many units of heavy artillery equipped with guns ranging up to 10 and 12 inches in caliber, both for fixed emplacement and for mobile artillery. This comprises the artillery reserve of the corps. The great general artillery reserve of the field army is under direct command of the army commander and included in his so-called army troops.

Artillery of All Calibers.—The organization schedules show that General Pershing is to be equipped eventually with artillery of all calibers on a scale not heretofore dreamed of. The proportion of artillery to army rifles adopted by the War Department is greater than that of either the British or French armies and the tendency of the department is to increase the big guns.

Included in the heavy artillery assigned to corps or field army commanders will be whole brigades of anti-aircraft guns, mobile howitzers of 6-, 8-, 10- and even 11-inch caliber, rifles of similar size, including heavy long-range naval guns, and probably, as soon as they are available, batteries of the monster American 16-inch naval rifles recently developed. With this array of guns enemy depots 20 miles or more in the rear of his trenches could be kept under bombardment.—*N. Y. Herald*, 8/3.

ORDNANCE AND GUNNERY

PRELIMINARY FACTS CONCERNING THE BROWNING GUNS.—The curtain of secrecy has at last been raised, revealing to an anxious audience the light and heavy Browning guns. The occasion was the official demonstration on February 27 at Congress Hill, a few miles out of Washington, D. C., in the presence of members of Congress, army representatives, foreign military attachés and 50 or more reporters.

So the light-weight Browning gun and the heavy-duty Browning machine gun are no longer a mystery. The former is practically a rifle, an automatic rifle weighing 15 pounds, while the latter is a machine gun very much along the lines of the Maxim in appearance, weighing but 34½ pounds. Both guns handle the same ammunition that the American forces in France will use in their Springfields and modified Enfields, namely, the rimless .30 caliber, cupro-nickel jacketed cartridge, which develops a pressure of 50,000 pounds to the square inch at the moment of discharge. Thus the ammunition will be interchangeable between all four weapons, which is an important consideration at the battle front.

Taking up first the light Browning gun, this weapon may be described as a rifle with automatic and semi-automatic action. That is to say, it can be employed for continuous fire, emptying its entire magazine in rapid order at the command of the trigger, or it can be employed as a self-loading and self-cocking rifle, in which case the rifleman pulls the trigger for each shot. In tests the gun has discharged its 20 rounds in 2½ seconds.

The Browning light gun or machine rifle, as it is designated by the army officials, is of the air-cooled, gas-operated design. It may be fired from the shoulder, the rifleman finding his target over sights identical with those used on the new United States rifle, model of 1917, or from the hip, the rifleman finding his target by his general sense of direction, the latter being a knack quickly acquired through practice.

The principle of gas operation is simple. The gun is cocked with an easily operated handle for the first shot. The bullet is expelled by gases, which, as already stated, exert a maximum pressure of 50,000 pounds to the square inch. A small portion of this powder gas is taken off by the gun mechanism to act as power to operate the gun automatically. A bullet discharged from this gun has approximately the same energy as that fired from the United States rifle, model of 1917, or from the Springfield service rifle. Cartridges are fed from a detachable magazine containing 20, or for special purposes 40, service cartridges. The magazines may be detached by merely

pressing a button and a new magazine attached by one motion, this changing operation requiring about two and a half seconds.

The gun may be operated as an automatic or as a semi-automatic arm by the manipulation of a conveniently located lever. By putting the lever in the first position, the gun is made to fire single shots by trigger release; by putting the lever in the second position the gun becomes an automatic and will fire 20 shots in from two and a half to three seconds; the third lever position is the "safe" or locking device. It is said by the military authorities that the designer intended the gun to be used more as a semi-automatic than as an automatic arm.

Powder gases create terrific heat, sometimes developing the destructive temperature of 4000 degrees Fahrenheit. An air-cooled automatic gun, therefore, has its limitations. The Browning rifle has an open and very simple construction and cools remarkably quickly. The rifleman may fire 350 continuous shots from it without having to stop and cool the weapon.

The chief characteristic of the gun is its extreme simplicity of construction, rendering the manufacturing problem correspondingly simple. It has fewer than 20 principal parts and possesses the great advantage of standardization, being easily and quickly taken apart and reassembled by the ordinary soldier. From the manufacturing viewpoint, the gun possesses the great advantage that it may be promptly produced in large and increasing volume as shop machinery is multiplied and operating personnel developed.

Used cartridges are ejected from the side of the gun, never crossing the sight of the rifleman, and coming out with sufficient force to clear themselves beyond his notice. A feature of the rifle is that the cocking handle remains stationary when the gun is in operation and is so arranged that it will in no way hamper the gunner, thus eliminating a danger common to many guns.

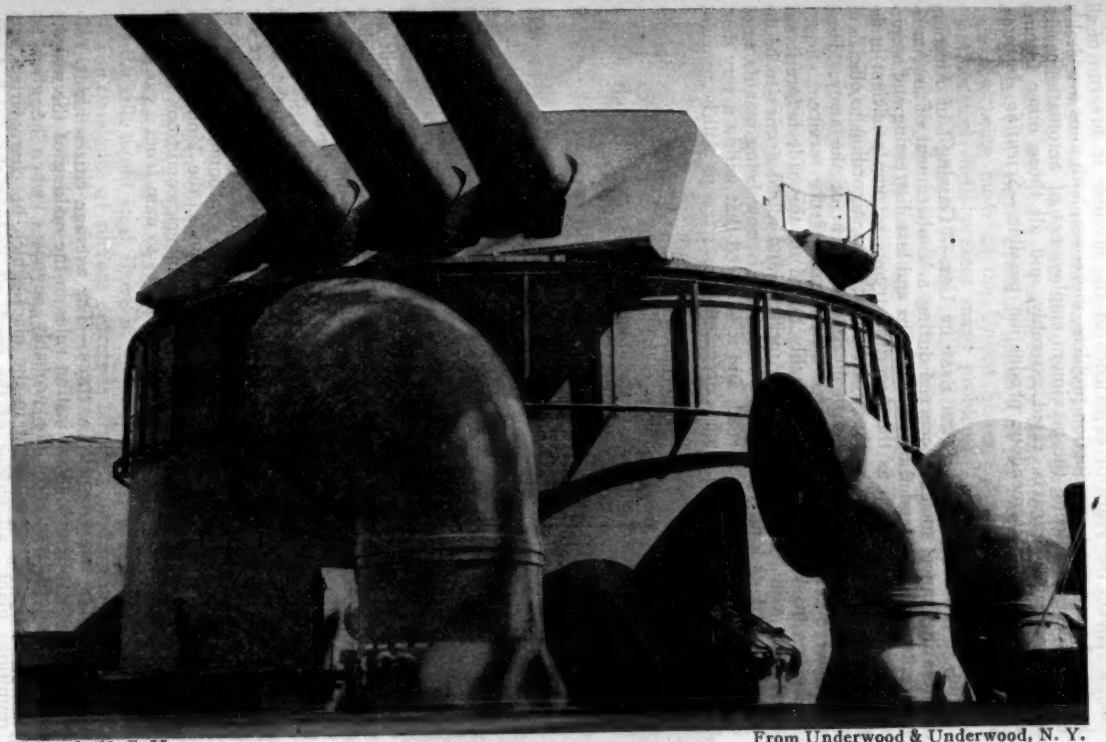
The gunner may operate the gun at all times without aid. Only one tool, a small wrench, is needed to care for the gun, as most of the operations of taking it down and reassembling may be performed by use of a cartridge as a tool.

As the gun is intended for the use of charging infantry, the problem of ammunition is naturally an important one. In this connection we are told that the gunner carries approximately 120 rounds of ammunition in his belt or bandolier, and his two assistants carry 400 and 240 rounds, respectively, loaded in magazines. The loaded magazine weighs 1 pound 7 ounces. Thus it is possible for a gunner to go into battle with a supply of about 800 rounds of ammunition.

Equally interesting is the heavy Browning gun, which is of the water-cooled, belt-feed design, and is operated by means of the power created by the recoil action. It is fed from a cotton belt which contains 250 rounds of service cartridges. The belts may be rapidly loaded by means of a machine which is a development of the one which Mr. Browning devised some 20 years ago in connection with the Colt gun.

Like the light gun, the heavy-duty Browning piece is marked for its simplicity of construction, rendering manufacturing problems easy and giving it a high degree of endurance. In the government test 20,000 rounds were fired from this gun with only three stoppages, one being due to a defective cartridge. In a further test firing was continued with the same gun to 39,500 shots, when the gear gave way. A duplicate gun fired 20,000 shots in 48 miuutes 16 seconds without a malfunction, and with only three stoppages, these being due to defective cartridges.

The light-weight but sturdy tripod of the Browning heavy gun permits the ready laying of the gun on its target. The cartridge belt is held in a wooden box fastening on the left side of the gun, as in the case of the Colt machine gun; this and the pistol grip of the new gun are reminders of the earlier gun of Mr. Browning's conception. This same gun, with certain modifications including the stripping of its water-jacket, weighs but 22½ pounds and should prove satisfactory for aviation service.



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From Underwood & Underwood, N. Y.

A FORMIDABLE FIGHTING BATTLEMENT.

A 14-inch turret barbette on board the U. S. S. *Pennsylvania*, flagship of the Atlantic Fleet.

It is still too early to pass judgment on the workability of the weapons under actual battle conditions. But as far as convincing tests are concerned, the guns have produced a most favorable impression. Furthermore, their design reflects the years of experience of the inventor in firearms of all kinds. As a quantity-production problem, moreover, both guns are ideal in every respect, permitting the maximum employment of automatic machinery, interchangeable parts, rapid assembly, and all those other features which go to make tremendous production possible.—*Scientific American*, 9/3.

U. S. TYPE GAS MASK RATED BEST IN USE.—"Gassing" of American soldiers in France, such as occurred during a bombardment of an American sector, will be attended by fewer deaths and less distressing and agonizing after effects as soon as the American troops become proficient in the speedy adjustment of gas masks provided for them, according to officials of the gas defence service of the medical department of the army. These masks were designed by the United States gas defence service.

The gas mask, which was thoroughly tested on this side before it was adopted, is said by experts of the American and allied armies to be the best device of its kind yet found. This mask is now being manufactured in quantities for shipment abroad, and it is stated that within a very short time every soldier in the trenches occupied by our troops will be provided with one.

The first work toward the establishment of an American gas defence service was under the supervision of the bureau of mines, which had the personnel and equipment to carry on experimental work. In July, 1917, a special department to carry on this work was established. Following the example of the English, the department was incorporated into the medical department of the army.

The defence service is divided into three separate parts: (1), field supply section; (2), field training section; (3), overseas repair section.

The function of the field supply section is to manufacture or procure all gas defence materials and equipment. The big work, of course, is to furnish our troops with effective masks. The small box respirator type of mask, admittedly the best mask in existence, was accepted as a model.

With no actual experience to depend upon, much experimental and research work was necessary. An extensive organization was built up, with branches in several cities. Recently it was decided to establish a government-operated plant to handle the final assembling and the difficult sewing operations on the face piece. This plant will soon be in full operation, with about 4000 employes.

The gas defence schools at all camps provide training in the theory and practice of gas defence. As in all other elements of warfare the principles of defence can be comprehended only through a knowledge of offensive tactics. So the 2500 or 3000 officers of a cantonment are formed into classes and instructed as to German methods, the kinds of gases used, how the enemy place their cylinders, atmospheric conditions favorable to an attack and the advantages the enemy hopes to gain from a gas attack. —*Washington Evening Star*, 1/3.

STEEL SHELLS FROM STEEL CASTINGS.—The average citizen hardly realizes the extent to which specialization rules in the making of the weapons used in modern warfare. He probably supposes, when he gives the matter any thought at all, that in the place which he characterizes as a "munitions plant" all phases of the work of making the finished projectile are to be found. In this he is far from correct. Powder making is an industry in itself; so is the fashioning of the metal casing for the shell; while powder and casing both travel long distances to be brought together in a special establishment given over wholly to that work.

Perhaps the most interesting of all these processes is the actual making of the steel bodies for the shells. These bodies are ordinarily made by either one of two general methods. Some, especially the very large ones, are forged down from large steel bars or rounds, as they are called, which have been rolled from crude raw steel ingots or billets. Others, especially the smaller sizes, have been made from cast-metal ingots direct.

The latter method has assumed very large proportions in this country in the last two years. Probably 40,000 tons per month of such shell ingots are now being made in the United States. Both of these methods of making steel shells present many problems. Even skilled producers of steel have had much to learn and have had to profit by some serious losses. Besides this, the inspection by foreign governments has been and is extremely severe, necessitating in many establishments, radical changes in ingot and steel production.

The problems connected with the production of small ingots, while similar to those for large ingots, are quite different. While the larger ingots are later rolled down into billets and rounds or forged down direct, the small shell ingots are at once formed into shells. The three principal problems involved are elimination of pipes or hollow places, the elimination of segregation, and avoidance of surface defect.

REVOLVING TABLE CONTAINING MOLDS FOR CAST-STEEL SHELLS, READY FOR POURING FROM A STATIONARY LADLE INTO THE MOVING MOLDS.

The vital factor in the elimination of pipes has been found to be the use of the hot top with the iron mold. This top consists of a sand cup or basin, similar to that used for pouring steel molds and reinforced with an iron rod. It has been found superior to and cheaper than any brick or refractory hot top. By the use of this and the addition of a small amount of charcoal on top of the metal as soon as poured, the main pipe has been entirely brought out of the main ingot. That is, the hole left by the cooling and contracting metal is filled up constantly and uniformly by the still liquid steel above it.

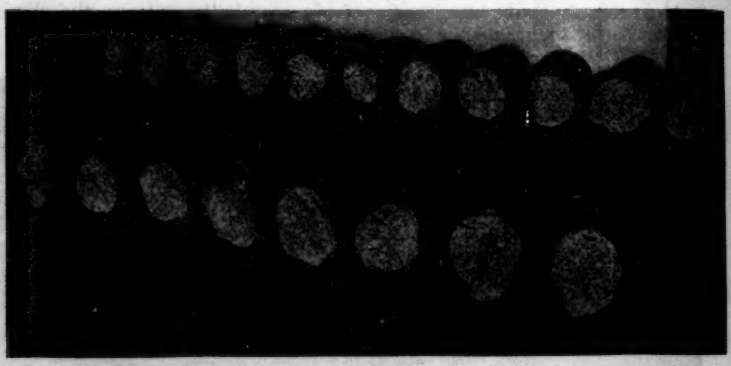
The avoidance of surface defects is largely bound up in the problem of the mold and its wash or lining. All shell ingots are made in cast-iron molds which have been found to be the only successful molds.

Most of the shell ingots made early in the last two years have been of the straight walled type, like a cylinder. As will be indicated later, there has been some objection to these in forging them because of the sharp edges at the bottom. In making recent 8-inch and 9.2-inch ingots a new type has been adopted. It has a tapered wall 8½ inches at the top and 7½ inches at the bottom, with a nose end. This is top-poured wide end up with a hot top and charcoal as in all other cases.

For pouring the small ingots a revolving table is used for greater speed and less loss of metal results than in moving the 25-ton bottom-pour ladle from one mold to another. This is shown by one of our illustrations.

Soon after pouring and while still at a cherry red the cast ingots are shaken out. The natural contraction of the steel makes this simple. As soon as cool enough they are removed a short distance to large friction saws. Here they are placed in a revolving mechanism where they are rotated while they are being nicked with the saw to a distance of about an inch into the ingot, and about two or three inches from the top—enough to insure a crop of 20 to 21 per cent.

The removal of this metal by a drop offers a fracture of the ingot comprising about 80 per cent of its area and affording ample surface for inspection for pipes or holes and porosity. The fractured ingots are rolled onto a table where they are chipped for surface defects and finally inspected by government inspectors before shipment to the forge shop. This inspection is urged by the company to be as severe as possible so as to avoid further losses.



ROWS OF CROPPED SHELL INGOTS, SHOWING THE CUT AND THE FRACTURE. IT IS IN THIS FORM THAT THEY ARE INSPECTED FOR PIPES AND HOLES.

The foregoing description briefly relates the process until the shell blanks are shipped to the various forge shops where they are finished into shells. Severe specifications must be met before the finished shells are accepted finally. That is, after the ingots or blanks have been converted into shells, representative tests are made of the metal. To guard against ultimate rejections there, the company at its place of manufacture casts representative ingots which it forges down into a bar 1¾ inches in diameter. After these bars are heat treated, that is, annealed similar to the final method at the forge shop, they are turned down and tested. The results so obtained afford a check on the final acceptance of the metal.

At the forge shops the blanks have a corresponding steel die, the shape of the finished shell, into which they are dropped after being heated to about 2100 or 2150 degrees Fahrenheit. They closely fit this die. A hydraulic ram hits one end of the ingot and forces it into the die until the hot steel completely fills the space. As soon as the hot steel has filled the die, a piercing ram is forced in, forming the hollow part of the shell, the excess metal oozing out at the back. The walls at this stage are about 1½ to 1¾ inches thick. These rough shells are then annealed and machined inside and out to the proper dimensions.

In forcing the ingots, cast in straight cylindrical molds, into the dies, it has been found that the sharp edge at the bottom before long injures

the die. To overcome this the straight ingots have been cast with a curved edge at the bottom, formed by a solid mold which has a curve on the outside formed by a ¼-inch radius. A still better method is the one already referred to and lately adopted—the tapering ingot cast with the nose end and wide end up.

The question of the relative merits of shells made from rolled rounds or from cast blanks has received some attention and it is claimed that in the case of transverse physical tests—those taken crosswise to the axis of the round—the cast round or blank is considerably superior to the rolled round.

Before the war the production of cast-steel shells was not large in the United States. There was but one plant devoted almost entirely to this class of work. Nor was the experience in making shells from steel rounds rolled from ingots extensive. Many foundries in the United States are now engaged in this important work and the number is growing constantly. Military preparedness has been one important result. But still more significant and striking are the metallurgical developments that have been brought to light. As the story unfolds it will be found that far-reaching advances towards sound steel have been the most vital achievement.

It is said that previous to the war Germany was the most skilled nation in making shells by the method described. It is surely the simplest. It is even declared that that country can successfully cast such shells hollow or ready for machining, eliminating the necessity of piercing and forging them. However this may be, the United States to-day is better prepared than ever, for many large and small steel foundries are now engaged in producing cast-steel shells.—*Scientific American*, 29/12.

NAVIGATION

ABERRATION OF SOUND SIGNAL.—The following instance of a silent zone near a fog signal is published for the benefit of those navigators who have not encountered this phenomenon or who have failed to take note of the caution published in the Light Lists issued by the Bureau of Lighthouses and by the Hydrographic Office under the heading "Fog Signals" in the introduction to those books:

"Proceeding to sea from Tompkinsville, Staten Island, January 17, we cleared the Ambrose Channel about 2.45 p. m., and about 500 yards to the westward of the whistling buoy Ambrose Channel light vessel was picked up. The wind was light westerly, that is, blowing from the ship toward the light vessel, and the distance from the whistling buoy to the light vessel is about 2½ miles. The weather was somewhat hazy. Soon after sighting the light vessel it was noted that she was operating her steam fog signal and that the sound of the fog signal was inaudible. We passed the whistling buoy within 100 yards and proceeded toward the light vessel, half a dozen observers on the bridge being cautioned to listen for the fog signal and report when it was first heard. Four of these observers were officers. The fog signal was not heard until the light vessel bore 15 degrees, distant about 700 yards, when four observers distinguished the sound. When the light vessel bore 0 degrees, we turned to starboard and the course was set 180 degrees. The signal was not heard after the completion of the turn."—*Hydrographic Bulletin*, 20/2.

FORTY-FOOT CHANNEL AT HELL GATE.—The *Scientific American* is heartily in sympathy with Murray Hulbert, Dock Commissioner of this city, in his endeavor to secure a 40-foot rather than a 35-foot channel through Hell Gate. Forty feet is the standard depth for all channels liable to be used by the capital ships of the United States Navy. Thirty-five feet is a rather scant depth for our largest ships even in peace time; but in time of war,

when such ships might have to make port in a damaged condition and drawing, therefore, many feet more of water than their normal draft, 35 feet would be all too little. Strategically considered, the possession of two alternative routes for our battle fleet to the sea from the Brooklyn Navy Yard, one through the Ambrose Channel and the other by the East River, would be of the greatest advantage. We have 40 feet in the Ambrose Channel and the same depth ought to be available through the East River.—*Scientific American*, 9/3.

ENGINEERING

RECORDING STEAM EFFICIENCY BY METER.—America is again showing us the necessity of recording steam efficiency and so reducing works cost. The Martindale Company of Bay City, Mich., have designed a recording meter which records the ratio of two quantities: Pounds of water evaporated per pound of coal, pounds of steam per kilowatt hour, or pounds of yarn per horsepower. For this there must be record of both input and output. In a chart, tracing the efficiency curve of water evaporated per pound of coal, the input curve is a measure of the coal burned and the output curve is a measure of the water evaporated. The chart is of the circular type, with three tracing pens for the three curves. Beneath it are four input dials and four graduated output dials. One of these may be connected to a mechanical stoker, and another to the indicator of a V-notch water meter. The pointer on the coal dial is set at the position indicating the number of pounds of coal delivered at each stroke of the stoker plunger. The pointer on the water dial is set at the position indicating the pounds of water calculated as a unit from the water meter, by an integrator or meter-reading device. At each stroke of the coal plunger an electric contact is made, energizing an escapement mechanism which adds the quantity of coal delivered to the record of coal consumed. Similarly, electrical impulses add to the water record the amount of water passed through the meter. By means of mechanism comprising cams and dividing arms the third pen is made to record the ratio of these two quantities, so that it draws a continuous curve representing the water evaporated per pound of coal. As the meter is electrically operated the measuring apparatus may be separated entirely from the recording apparatus.—*Page's Engineering Weekly*, 25/1.

THE METALLURGY OF FERRO-CHROMIUM.—An article of a general nature describing the manufacture of ferro-chromium and chromium steel and outlining the use of the latter.

Chromium in steel does not act as a scavenger, nor does it confer soundness on the steel as do silicon and aluminium. But added in small amounts it increases the tensile strength of the steel to some extent without markedly decreasing its ductility. When added in excessive amounts it causes brittleness.

The effect of chromium when added to steel is to raise the normal critical range, thus causing changes to take place at high temperatures and also more slowly. Hence, chromium steels are harder than ordinary steels, because quenching more effectively prevents the transformation of the austenite. When added to iron, chromium does not materially harden the metal. Chromium steels contain from 1 to 4 per cent or more of chromium, and the carbon may range from 0.50 to 2 per cent.—*The Iron Trade Review*, 12/7.

ACTION OF SALT ON REINFORCED CONCRETE.—Professor H. J. M. Creighton, in a contribution to the *Journal of the Franklin Institute*, covering his investigations on the action of salt and brine on reinforced concrete, summarized them as follows: All concrete which is not water-proofed in some way is more or less porous to water and brine. Brine readily softens the surface of concrete, and therefore, more easily penetrates to the reinforce-

ments, on which it exerts a disintegrating action that, owing to the attendant expansion, gradually weakens the concrete, causing it to crack and split, and in some cases to fall away from the reinforcements. The more porous the concrete the more rapid the disintegration of the reinforcements through the action of brine. Reinforced concrete floors which come in contact with brine will gradually develop leaks. These will be followed by incrustations of discolored salt on the underside, where, later, iron-stained, hair cracks will develop running parallel to the reinforcements. As the deterioration progresses the cracks will widen, and, owing to the great expansive force of the accumulating iron oxide, the concrete will be gradually pushed from the corroded reinforcements and ultimately fall.—*Page's Engineering Weekly*, 25/1.

GROUND SCREW THREADS.—In a recent issue of *The American Machinist*, Mr. E. A. Suverkrop describes a process by which precision taps and screw gauges are produced by grinding the threads out of hardened stock, thus eliminating the risk of warping which arises when taps and gauges are made out of soft material and subsequently hardened.

The process has, it is stated, been used for making taps and gauges ranging from 0.157 inch in diameter, with 36 threads per inch, up to 4 inches in diameter with 4 threads per inch. In the case of the larger sizes the grinding process is merely used for finishing the tap, which is roughed out in the soft state, hardened, and then brought true to pitch and form by grinding. With small sizes, however, the thread is generated from start to finish entirely by the grinding wheel.

The grinding wheels used were supplied by the Norton Grinding Company, and have grains listed as 38-100 to 38-200, grades J and I. The blanks to be cut are mounted between the center of a cataract lathe, which is fitted with a buttress-threaded hob, which gives the traverse to the grinding-wheel. This wheel is independently driven and, mounted on its saddle is a trueing device consisting of two diamond cutters, which can be traversed over the cutting faces of the wheel so as to maintain the accuracy of the angle between the flanks and the threads. The wheel is trued up on starting work and again when the work is within .01 of an inch of the finished size, and, finally, just before finishing, when the work is but 1 mil or 2 mils over size.

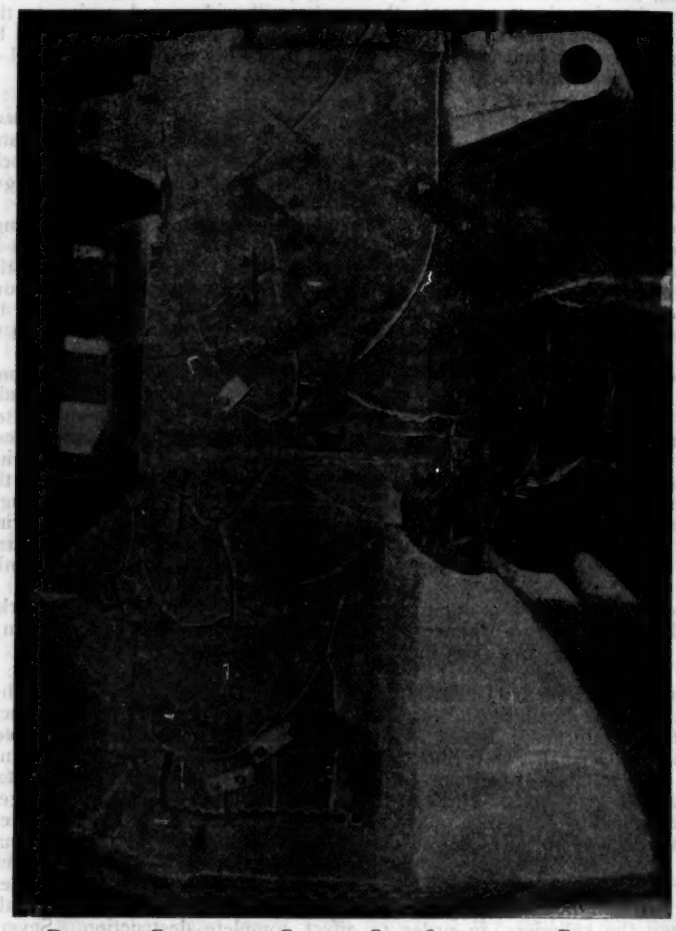
The machine, which is due to the engineer of the Presh Machine Works, Brooklyn, is stated to produce work accurate in every dimension within a limit of .0002 inch and .0003 inch.—*Page's Engineering Weekly*, 26/10.

REPAIRS TO INTERNED GERMAN VESSELS IN BRAZIL.—We reproduce a photograph of the damaged high-pressure cylinders of one of the German merchant ships interned in Brazil, as a result of the declaration of war between Brazil and Germany, as it illustrates the thoroughness of German destruction. The number of German vessels interned was approximately 45, totalling 235,000 gross tons. These had been more or less all seriously damaged, particularly the propelling machinery, and in some cases new cylinders throughout had to be made; in others only portions of the cylinders had been destroyed. The thoroughness of the work done by the German engineers is suggested by the fact that in one case of two damaged cylinders at least 8000 holes must have been drilled transversely and vertically through the cylinders, in order to effect complete destruction. Several of the vessels were taken over by the Brazilian Ministry of Marine and others by the Lloyd Braziliero Company.

In the early part of 1917 the Brazilian Government invited Messrs. Vickers, Limited, who had placed their experience at their disposal, to send an engineering technical officer to Brazil to survey the damage to the machinery and carry out the necessary steps for its repair. It was found that not only could the work be carried out in Brazil itself, but in the naval arsenal of that country. It was, therefore, decided by the Ministry of

Marine to proceed immediately with the re-casting of the damaged cylinders and liners, and great credit is due to the engineering officers of the Brazilian Navy and to the personnel of the arsenal, not only for executing the work, but for the expedition with which it was carried out.

The photograph we reproduce is of the high-pressure cylinder of a quadruple set of engines, the diameters being 26 $\frac{3}{10}$ inches, 38$\frac{1}{8}$ inches, by 54-inch stroke. The cylinders illustrated had been broken into hun-



DAMAGED CYLINDER OF GERMAN SHIP INTERNED IN BRAZIL.

dreds of small pieces, and in order to make new cylinders to suit the set it was necessary to collect as many pieces as possible and to erect them as illustrated, so that the dimensions of the cylinders could be measured accurately. When erected, photographs were taken, and we are indebted to the Brazilian Minister in London for permission to reproduce these photographs. Portions of cylinders were also re-cast and welded in position in the engineering workshops in Brazil.

It is an interesting fact that most of the broken parts of the machinery were, in the case of the greater number of vessels, carefully stored between decks, evidently in order to be used as scrap metal in Germany, in the event of the return of the ships to the "Fatherland."—*Engineering*, 15/2.

MAGNESIUM CHLORIDE.—*Its Action on Boiler Plates.*—Although engineers proficient in their work are fully aware of the behavior of magnesium chloride in connection with plates and tubes, there is evidently much justification for extending the knowledge into many quarters where the baneful significance of corrosion is not sufficiently realized. We hear quite a lot concerning scale and its accompanying mischief; but the insidious action of magnesium chloride is still more striking, yet there is no actual deposit of it, either in the water or on the metal. It has, indeed, proved to be one of the most mysterious of destructive agencies, and only the closest scientific investigations have enabled engineers to ascertain the whole measure of its possibilities, and to devise methods for its suppression. It is, therefore, worth detailed consideration.

The peculiarity about magnesium chloride is that it is always responsible for corrosion of the metal above the water-line in boilers, besides steam pipes and condenser tubes, etc. The reasons for these phenomena are understood when magnesium chloride is studied. Upon heating the solution it does not evaporate and leave salt sediment, as do the vast majority of substances—for example, the other mineral contents of water—but decomposes into magnesium oxide and chlorine. The former is produced by the abstraction of oxygen from the water, and its union with the magnesium, the chlorine from which is liberated so that it rises with the steam and settles on various parts of the metal as hydrochloric acid, having become chemically combined with the hydrogen of the water. Magnesium chloride is a compound of magnesium (or magnesia), and chlorine, the latter being derived chiefly from the decay of animal and vegetable refuse. As already stated, it exists only in solution, unless exceptional trouble is taken to solidify it. This matter will be referred to again.

On land, the principal source of magnesium chloride is the magnesian limestone, or dolomite, beds, rocks, or soil, through which rain passes, and thus by means of assistant chemical agents, disintegrates and dissolves the mineral matter. Chlorine is the necessary converting element, and this is generally found incorporated with the water as hydrochloric acid. The latter in attacking the magnesian limestone—this is a combination of magnesium carbonate and lime carbonate—drives out some of the carbon-dioxide therefrom, and itself seizes upon the magnesium, thereby constituting a solution of magnesium chloride, which is carried away into springs and channels used as the water supplies for boilers. In marine directions the magnesium chloride emanates direct from the sea, where it occurs quite normally on the average of about 3.15 per 1000 parts. Unless it is satisfactorily counteracted its steady, persistent operations eventually cause very disastrous effects.

It will be plain that while magnesium chloride is contained in the water of the boiler it is in a neutral condition, and cannot injure the metal. But upon the application of heat it is split up into magnesium oxide, which sinks as a fine white innocuous powder, and chlorine, which rises into the spaces above and away from the body of water, and becomes hydrochloric acid. It is on this account that the metal below the water-line is not affected by it; whereas the other portions are gradually exposed to its destructive tendencies.

The salt, magnesium chloride, can be obtained in the solid, fused or melted state by roundabout processes; but it is then so unstable that immediately upon being exposed to the air it absorbs the invisible moisture therefrom, and becomes a solution again. It cannot be properly isolated by boiling its solution as it exists ordinarily in water, but systematically

changes in the manner previously described. If ammonia were present in the same spaces where chlorine, and subsequently hydrochloric acid appears, the acid would combine with the gas and yield chloride of ammonia (better known as sal ammoniac), which being a soluble salt would descend and dissolve in the water; and nullify the corrosive properties of the hydrochloric acid. This re-action is not suggested as a remedy, for very good reasons; but is mentioned to explain how curious are the available modifications.

Chlorine and its vapors have bleaching powers, as can be demonstrated by suspending a colored fabric or paper within it. Suppose that a large strip of blue litmus paper is placed in the boiler above the water-line, or in the adjoining pipes. If magnesium chloride is present in the water heat will drive the chlorine up into the color, and this gas will remove some of it, making the fibers white, but after awhile, as the hydrogen of the steam

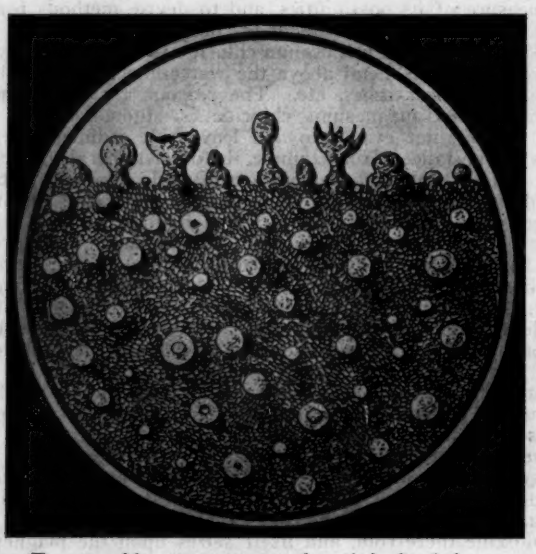


FIG. 1.—About one-twenty-fourth inch of the surface and edge of a piece of boiler-plate after the action of acid from magnesium chloride. This is an early stage—magnified.

unites with the chlorine to compose hydrochloric acid, the latter will turn the blue into red, thereby establishing its acid nature. It is obvious that where the metal is pitted there has been concomitant disintegration and removal. The combination of it with hydrochloric acid forms a salt called iron chloride, which separates as a greenish or brownish solution, and falls into the water, where it may mix with the lime and other magnesium residues, or sludge, and tint it accordingly. If weak, the whole deposit will be greyish, owing to the admixture of abundance of white salts with it. If stronger, it will impart a greenish or brownish tinge to the other minerals. It may affect adhering scale as well, in severe cases. These shades are altered by the presence of various foreign matters, such as true rust or dirt.

The hydrochloric acid produced as outlined is, of course, diluted by the steam, or water into which it condenses. It depends on the extent of

corrosion of the metal by it whether a ferrous or ferric salt results. Intermediate, indefinite, grades are naturally also possible. Ferrous chloride is greenish; while ferric chloride is reddish brown. The former may be fairly bright, or else dull; and the latter rusty-looking, or else almost black. The various products merge one into the other, extremes passing indistinguishably into those stages which intervene. On microscopical examination of the corroded particles one can see ranges of color through yellow, brown, green, and red of striking gradations. The terms of ferrous and ferric indicate two phases of iron, the first named containing less oxygen than the second, and being capable of rapidly changing into it. Ferrous chloride is, therefore, iron chloride of weaker constitution than ferric chloride; but both are compounds of iron and hydrochloric acid. (By the way, the chemist never speaks of salts of *steel;* because the latter and iron are essentially the same.)

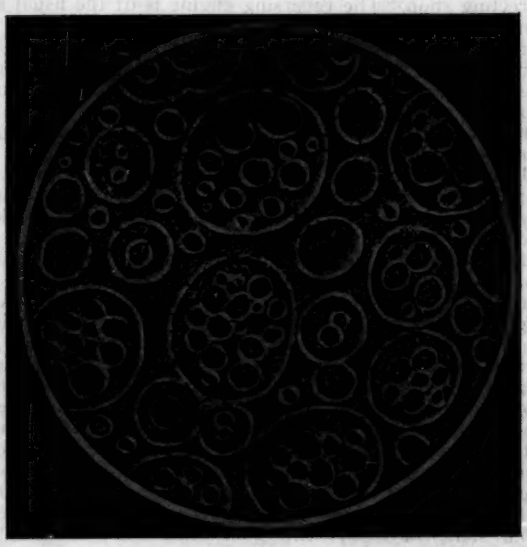


FIG. 2.—About one-twenty-fourth inch of the surface of a piece of boiler-plate after the action of acid from magnesium chloride. This is a later stage—magnified.

In boilers that cease working for a time some of the hydrochloric acid would still stick to the metal; and as cooling followed would form portable chloride salts; the greener ones being crystalline and the browner ones amorphous. Their details become pronounced when the substances are scraped off and examined by themselves.

In Fig. 1 is shown a piece of boiler plate, experimentally subjected to the action of hydrochloric acid vapor evolved from water containing magnesium chloride. The minute greenish, reddish, or brownish beads thus formed by the corrosive globules are mostly stalked, and hollow.

In Fig. 2 is shown a later stage, after a lot of the metal has flaked off. Multitudes of minute pores (basins left after splitting of the hard beads) cluster together, the pitting going deeper and wider as flaking continues. —*The Marine Engineer and Naval Architect,* January.

STANDARD PROPELLING ENGINES FOR BRITISH STANDARD SHIPS.[1]—In supplement to our article on British Standard Ships, which we published in an earlier issue (page 553, *Engineering*, 1917), we now give illustrations of the standard engines designed and built for these ships. The main engine design does not present any new features, and is fairly representative of that usually adopted for triple-expansion engines having cylinders 27 inches, 44 inches and 73 inches diameter by 48-inch stroke. The outstanding feature, which indicates that the design is of Clyde origin, is the front columns which carry the piston-rod guides, as against the slipper-type guide which is a feature of the northeast coast design. Special attention has been given to details for convenience in machining and assembling, the piston type of valve for the medium-pressure cylinder, for example, being adopted chiefly on that account. The circulating pump, which is of the centrifugal type, 12-inch bore branches, is mounted with its engine on the main engine bed-plate so as to enable it with its pipes and connections, to be fitted complete in the erecting shop. The reversing engine is of the usual all-round type, and an independent turning engine is provided.

All the designs, with the exception of the auxiliary machines, were, of course, prepared by one firm, who had extensive experience in machinery of this size for cargo vessels, and were issued to the various machinery contractors complete, together with full detail specifications of all the raw material orders and the finished items which it was arranged to obtain from sub-contractors. A degree of detail quite unusual for this class of work was embodied in the drawings and information issued, so that even those firms who were not familiar with such work—some of them accustomed to a smaller class and others to the highest class of Admiralty work—would have no difficulty in knowing exactly what was required.

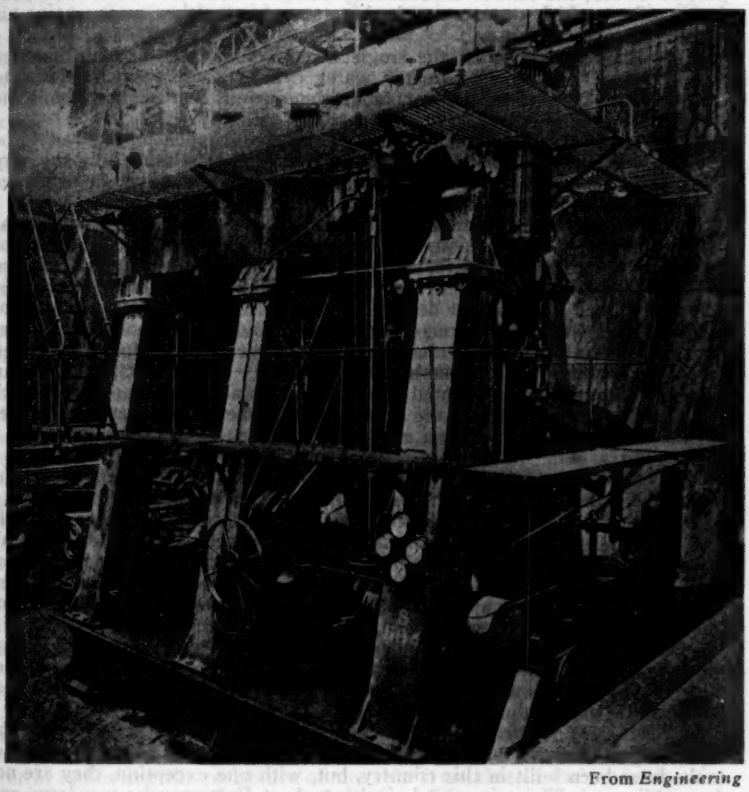
The advantages of manufacture to a common design were found of convenience in many ways as when, in the course of construction, one firm discovered defects in a sole-plate casting; this was at once replaced by a similar casting from another firm, who were not at the time requiring that casting, failing which possibility of delay of weeks would have occurred with the erection of the whole engine. Another instance was the facility with which a replace main steam pipe branch piece was immediately despatched to a vessel ready for trial trip, when the original one showed leakage on the first steaming of the engines. The greatest advantages of this manufacture of details in multiple were, of course, experienced by the sub-contractors for these details, as they were thus enabled to proceed with a very large number of each article exactly alike instead of each differing, perhaps only in very small points, to suit the arrangements prepared by individuals, but sufficient to prevent them being used for the first firm requiring delivery.

It can readily be understood that many of the small items in a modern cargo vessel's engine-room could be manufactured to better advantage by specialists, than by large firms whose plant is generally suitable for large work, the items of which are different for each vessel, and especially so when orders for scores of these smaller items could be placed at a single time. The orders for all the auxiliary machinery, also the various valves, valve-boxes, branch pieces, cast-iron and wrought-iron pipes, etc., were consequently issued in multiple, from a single source, and placed with firms who specialize in such work so that once they had prepared patterns and templates to the drawings they could manufacture these fittings for all the vessels, drilled and ready to fit in place. Fo rinstance, the main steam pipes were finished complete by tube-makers to drawings, having been so designed that the unavoidable inaccuracies in fitting boilers and engines in place could be taken up at the joints and thus overcome the delay which otherwise invariably occurs through having pipes made to fit the place after everything else is in position.

[1] From *Engineering*.

The smaller castings for the main engines were also ordered in multiple, thus avoiding unnecessary pattern-making, as all the firms on the Clyde were supplied with those castings from two sets of patterns in all. This procedure enabled the machinery contractors to concentrate their attention on the bigger things with the knowledge that the smaller things were, so far as they were concerned, looking after themselves.

The positions of the auxiliary machinery were arranged so as to give the least work in completing the vessel after it was launched, the positions being so chosen that all erection could be completed in the shipyard before



From *Engineering*

STANDARD TRIPLE EXPANSION ENGINES FOR BRITISH STANDARD MERCHANT SHIPS—FRONT VIEW.

the launch, the various connecting pipes being of the simplest form while providing all the conveniences for working usually found in first-class work.

The feed filter, which is of the gravitation type using coir fiber, open to observation and replacement while the engines are working, is embodied in the main engine hot-well attached to the air pump, so that it is completely fitted in the engine works and no pipes and connections at all are required for it. The feed heater is of the well-known mixer type, and is also embodied in the main engine hot-well, the whole making a very compact arrangement with the minimum of fitting work. The evaporator is of the

vertical type, capacity 25 tons per day, and conveniently arranged at the back of the main engines.

The winches are of the usual plain cargo-vessel type and number, arranged to exhaust to a winch condenser placed in the engine-room. The winch condenser is of ample size to deal adequately with the exhaust from the winches and so facilitate expeditious discharge of cargo. A general service donkey and a harbor-feed donkey are provided, both alike, of the single direct-acting type, with 9½ inches diameter steam cylinder, 7-inch diameter water cylinder, 18-inch stroke, and capable of feeding boilers in port or at sea, the harbor-feed donkey being fitted with automatic control from a float which operates with the water from either main engine air pump or winch condenser.

The ballast donkey is of the single direct-acting type, 11-inch diameter steam cylinders, 14-inch diameter water cylinder and 24-inch stroke, to quickly discharge water ballast from the various tanks throughout the vessel.

Owing to prevailing circumstances the use of copper piping had to be avoided. Wrought iron has been largely used throughout, only the very small pipes being made of copper. As a result, the total weight of copper piping is less than one-sixth of that usual in this class of vessel.

The boilers—three in number—are of the well-established multitubular return-tube type, 15 feet 6 inches diameter by 11 feet 6 inches long, for 180 pounds working pressure, working under Howden's system of forced draft. They do not present any special features, although it may be mentioned that the original design, prepared for the minimum among of workmanship and expeditious construction, had to be modified in later boilers on account of the present demands on steel works for large plates, so as to enable those available to be utilized. The principle of manufacture in multiple was adopted for boiler parts also, this applying to such items as tubes and furnaces, the latter being finished to one set of templates for all firms.—*Scientific American*, 26/1.

PROPULSION OF SHIPS.[1]—The object of this paper is to emphasize the necessity for experiments on the resistance and propulsion of ships.

That work is done on models of ships in experimental tanks is probably well known. The experimental tank, however, cannot, of itself, give all the information required to establish the science of ship resistance and propulsion on a firm basis. The limited knowledge of the science renders necessary a number of approximations, and errors are consequently introduced when estimating the resistance of a ship from its model. There is, however, no other method available. In addition, to extend our knowledge much work remains to be done with models. The coordination of model experimental results and observations on full-sized ships, herein advocated, would settle many doubtful points.

The Value of Model Experiments.—It was about 50 years ago that the late William Froude built a model tank at Torquay. Since then, a few tanks have been built in this country, but, with one exception, they are not for public use. There is an Admiralty tank at Portsmouth; two large and four small ones are owned by private shipbuilding concerns. The one already referred to, available to all those interested, is the Yarrow tank at the National Physical Laboratory, Teddington. That good work has been done in these tanks goes without saying, and it is not too much to say that practically all the progress made in ship resistance and propulsion during the past 50 years is due to them.

Ship Resistance Deduced from Models.—The resistance to the motion of a ship is generally divided into four parts, namely, the skin, caused by the friction of the water on the surface of the vessel, the wave making, the

[1] Read by Mr. A. T. Wall, M. I. N. A., before the members of the Liverpool Engineering Society, in December, 1917.

eddy making, caused by unevenness of the surface such as occurs with appendages and air or wind resistance. The eddy resistance should be small, although it is not always a negligible quantity. Wind resistance depends on the above-water form of the ship. Skin resistance is accompanied by eddies or whirls in the water near the ship's surface, but this is not included in the expression, eddy making resistance, as used above, for ships. The skin resistance of a ship form, whether of model or ship, is estimated by a formula derived from experiments on plane boards. The maximum length of the boards used was 50 feet, and the maximum speed at which they were towed 8 knots. It was found that the resistance of the boards varied as the product of a co-efficient, their area and a certain power of the speed. The co-efficient varied with the length. Different experimenters obtained slightly different values for the co-efficient and the power of the speed, but the differences are not great.

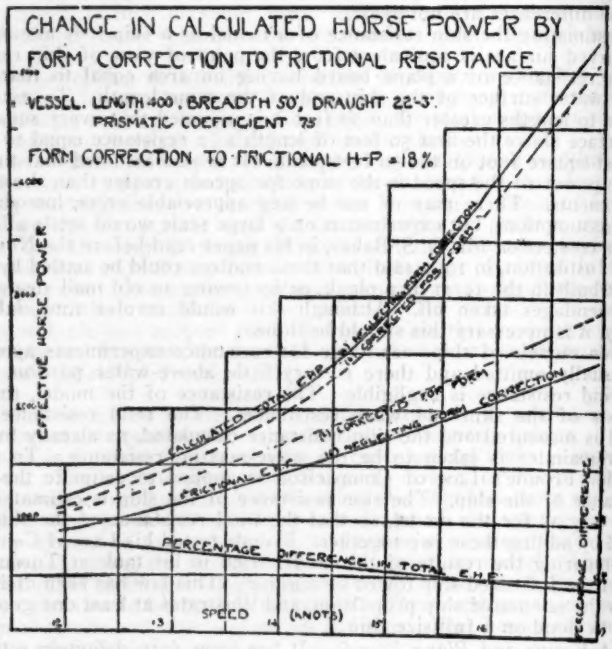
In estimating the skin resistance of a model or a ship it is assumed that the curved surface is equivalent from the point of view of skin resistance to the resistance of a plane board having an area equal to that of the under-water surface of the ship and of the same length. To extend the results to lengths greater than 50 feet it is assumed that every square foot of surface above the first 50 feet of length as a resistance equal to that of the last square foot on the 50 feet plank. It is also assumed that the index of the power of the speed is the same for speeds greater than those of the experiments. There may or not be any appreciable error introduced by these assumptions, but experiments on a large scale would settle all doubts. In this connection Mr. G. S. Baker, in his paper read before the North-East Coast Institution, in 1915, said that these matters could be settled by towing a boat built in the form of a plank, or by towing an old mail steamer with its appendages taken off. Although this would involve time, labor and money, it is necessary this should be done.

When models of ships are made for resistance experiments appendages are usually omitted and there is very little above-water portion, so that the wind resistance is negligible. The resistance of the model, therefore, consists of the skin and wave resistances. The total resistance of the model is measured and the skin resistance calculated, as already indicated. The remainder is taken to be the wave-making resistance. To this remainder Froude's Law of Comparison is applied to estimate the similar resistance of the ship. The skin resistance of the ship is estimated in the same way as for the model, so that the total resistance of the ship is obtained by adding these two together. Froude tested his Law of Comparison by comparing the results of the model tried in his tank at Torquay with that of the full-sized ship towed by another. This law has been of immense use in the science of ship propulsion, and illustrates at least one good result of work done on a full-size ship.

Ship Forms and Plane Boards.—It has been very definitely established that Froude's Law of Comparison applies with great accuracy to the wave-making resistance. In spite of this, however, there is a possible source of error in estimating the resistance of the ship from that of the model in this way. The ship form differs in its behavior with regard to skin resistance from that of the plane board, the value of the former being greater than that of the latter having the same length and area, and this increase is greater the fuller the form of the ship. Experiments[1] carried out by Mr. G. S. Baker in the Yarrow tank at Teddington show that at the slowest practicable speeds models give a resistance exceeding that deduced for a corresponding plank by an amount varying from 5 per cent to 29 per cent. Unfortunately, this increase is not the same for the ship as for the model, and it is not possible to say with accuracy what its value is for the former, although it can safely be said that it is not so great as in the model.

[1] "Transactions," Inst., N. A., Vol. LV., Part II.

The effect of this can best be illustrated by an example. In slow-speed merchant ships, where the under-water form is full, the skin resistance of the model may be as much as 80 per cent of the total, that is, supposing that the skin resistance is calculated as if the surface were a plane board. To the remaining 20 per cent, therefore, Froude's Law of Comparison would be applied. Actually, the skin resistance of the model being, say, 20 per cent above the calculated figure, it is in reality 96 per cent of the total and the wave resistance only 4 per cent. It is to this latter figure that Froude's Law of Comparison should strictly be applied, and when the skin resistance of the ship is calculated it should also be increased by some percentage which is at present unknown.


CHANGE IN CALCULATED HORSE POWER BY
FORM CORRECTION TO FRICTIONAL RESISTANCE
VESSEL. LENGTH 400', BREADTH 50', DRAUGHT 22'-3".
PRISMATIC COEFFICIENT .75
FORM CORRECTION TO FRICTIONAL H-P = 18%
EFFECTIVE HORSE POWER
CALCULATED TOTAL E.H.P. (1) NEGLECTING FORM CORRECTION
(2) CORRECTED FOR FORM
FRICTIONAL E.H.P. (1) NEGLECTING FORM CORRECTION
PERCENTAGE DIFFERENCE IN TOTAL E.H.P.
PERCENTAGE DIFFERENCE
SPEED (KNOTS)

The accompanying diagram shows two effective horsepower curves obtained for a 400-foot ship from the results of a model run in a tank. The upper curve is derived as is usual at present. The lower curve has had the form correction for skin friction applied (the same value as in the model). The differences in the two results expressed as a percentage can be seen from the diagram. These percentages are somewhat greater in a longer vessel at the same corresponding speeds but decrease substantially with decrease of lengths.

The Law of Skin Friction.—In 1912 it was pointed out by Dr. Stanton in a paper before the Institution of Naval Architects in which surface friction was discussed, that provided a body was submerged to such an extent as to avoid the formation to surface waves and that the velocity at which it was moving was not high enough to cause cavitation, the resistance of the body will depend solely on its dimensions and nature of surface, and on the velocity, density and viscosity of the fluid. In such a case, by the applica-

tion of the principal of dynamical similarity, it is possible to predict the friction and eddy making of a ship from its model. This is a particular case of Rayleigh's General Law, which may be expressed as follows. The frictional resistance per unit area of a surface is proportional to the squares of the corresponding speeds. The corresponding speeds are those such that the product of the speed and the linear dimension of the body is constant. This, of course, is different from Froude's Law of Comparison, which makes the corresponding speeds vary as the square foot of the linear dimensions. The first law is considered by many to have been definitely established, with the result that they say it is the only safe one to use for resistance experiments on dirigible balloons, submarines and torpedoes. Unfortunately, since the corresponding speeds are inversely proportional to the linear dimensions it would be necessary, in order to determine the resistance, say, of a submarine submerged at 10 knots, to drive the model, say, on a scale of one-tenth the full size, at 100 knots and the force required to drive the model at this speed would be the same as for the full-sized submarine at 10 knots. This is at present impracticable, and therefore the ordinary method is used for computing the resistance of submarines from model experiments.

This law has an interesting application in that it can be used to find the resistance of a dirigible balloon from that of a scale model run in water. For this purpose if V is the speed of the full-sized dirigible, L and 1 linear dimensions of the balloon model, and the latter must be towed at a speed represented by $\frac{VL}{13L}$. The resistance of the full-sized dirigible at V feet per second will be the resistance of the model in water divided by 4.7 approximately. The Froude Law of Comparison is applied to wave and eddy making resistances, although Dr. Stanton has stated that it appears possible that the eddy making resistance per unit area of a full-sized ship may be from 10 to 15 per cent different from that of the ordinary sized model used in tank experiments. In consequence, he says, the application of the Law of Comparison to eddy making is not strictly correct, although the error involved must generally be a small one. This is quite distinct from the difference already pointed out between the skin resistance of a ship-shape form having the same area and length as a flat plank.

An interesting application of the law of dynamical similarity was mentioned by Mr. G. S. Baker in the discussion on Dr. Stanton's paper. After showing that the law held fairly closely for flat surfaces in water he went on to say that it would be possible by its use to obtain—as Dr. Stanton had suggested—the absolute value of the wave-making resistance of a model from results obtained with full-sized ships. For this purpose it would be necessary to moor a ship in a slow tidal current and measure its resistance and work from the ship to the model to find its frictional resistance. For the high speed of the model the friction and eddy making resistance can be obtained and so, working backwards instead of from model to ship as is usually done, it would be possible to differentiate in a manner not heretofore possible, between frictional resistance and wave making resistance of the ship-shaped form running at high speeds. This would enable the increased resistance of ship-shaped forms over plane surfaces to be measured.

In the discussion on Mr. Baker's paper read at the North-East Coast Institution of Shipbuilders and Engineers in 1915, it was generally agreed that there was a great need for verification of the elaborate and interesting work Mr. Baker had done on surface friction of models by means of full-sized experiments. Mr. A. W. Johns also thought that, after reading the paper, one was forced to the conclusion that much experimental work had yet to be carried out before our knowledge of the skin resistance of ships was placed on a correct basis.

The effect of Mr. Baker's modifications to the method at present in use for computing skin resistance is very great, as shown below:

Effective horsepower in *Greyhound* (172 feet long).

	At 6 knots	At 11.84 knots
Froude	40.9	630.7
Baker	38.6	613.3

Effective horsepower in ship 600 feet long.

	At 18 knots	At 20 knots	At 22 knots
Froude	7,160	10,240	14,730
Baker	6,225	8,900	12,980

This matter also received attention in a paper by Dr. Lees, read before the Institution of Naval Architects in 1916. He stated that the subject would be put on a much firmer basis when data for boats of intermediate sizes has been secured by measurements made on submarines 100 to 200 feet long towed under-water. In the discussion that followed this paper, Professor Dalby stated that there was a need for additional data derived from experiments with ships of large size in order to get better correlation between actual resistances and the resistances deduced from models. Such data would enable a better interpretation of the model results to be made. To put the proposal in a concrete form, he stated that a large liner or a powerful battle cruiser should tow a series of ships of modern dimensions, in order to definitely establish what are the resistances of long ships at different speeds. The technical difficulties in this would easily be overcome. The real difficulty is one of expense and the general reluctance to spend money on scientific experiments. Considering the magnitude of issues at stake both for the Admiralty and for the mercantile marine, the financial difficulties should not be insuperable.—*Marine Engineer and Naval Architect*, January.

AERONAUTICS

AN ADDITIONAL LIFTING FORCE FOR AIRPLANES.—By Carl Hering.—The lifting force in the usual airplane of to-day is that due to a plane inclined slightly to the direction of motion, and forced forward by the propeller. It acts in a vertical direction according to the same principle that the rudder of a ship acts in a horizontal one. The lifting force is due partly to the compression of the air below the inclined plane, and partly to the suction of the rarefied air above it. Both of these forces act only when the plane is in motion, hence are zero when it is at rest and are very small when the airplane is starting from the ground or the sea.

In the helicopter principle the propeller moves in a horizontal plane and lifts by direct propeller action; but this has not come into general use, and it is said to require about six times the power to lift in this way as by means of the forward-moving inclined plane.

There is a third and quite different kind of lifting force which is available in all the propeller-driven airplanes of to-day, but which is not now used. It would require but slight changes in the present construction to make use of it, and as it seems to consume no additional power, it is of the nature of a gift; it is there to be used but is not at present being made use of; its use has been overlooked or neglected. It is of special interest as it is greatest when the airplane is at rest and therefore just when the usual lifting force is least, hence at the very time when any addition to the lifting force, even though small, is very important. One of the serious drawbacks in the use of modern airplanes is that when they start from the ground a comparatively large area free from obstructions is required for getting up sufficient speed, while on the ground, to produce enough lifting force to raise the airplane up high enough to clear the trees, telegraph poles, buildings, etc.

The principle of this new lifting force is best illustrated by some well-known experiments. Referring to Fig. 1, let *N* be a nozzle through which a stream of air is issuing in an upwardly inclined direction. When a ball *B* is placed just below this stream a short distance from the nozzle, it will be found to remain suspended; the ball may be said to be hung on to the bottom of the air stream considered as a sort of a beam.

A possible explanation of this peculiar phenomenon is that the stream of air causes a partial vacuum above the ball and that the ball is therefore supported by the air pressure from underneath. If this is the correct explanation, the theoretical maximum lifting force which could be produced in this way would be atmospheric pressure, namely, a little more than one short ton per square foot, a maximum which of course could never be expected to be nearly reached, but a very tempting one to approach as closely as possible; obtaining only as little as 1 per cent of this would still be 20 pounds per square foot, which is very large compared with the present lifting and sustaining force which is said to be about 4 to 6 pounds per square foot, and this only at high speeds, it being zero when the plane first starts. If this explanation of the phenomenon is correct, the experiment of suspending a ball from a stream ought not to operate in vacuum, in which case a stream of some other fluid than air would of course have to be used, one with a low vapor pressure, like mercury for instance. It is not known to the writer whether this has been tried.

Another form of this force is illustrated in the well-known experiment shown in Fig. 2 in which a horizontal card *C* has a hole *H* cut into it; by blowing horizontally over this hole a card *C* placed below it will be held up by the air stream. In the usual form of atomizers it is this same force that lifts the liquid in the vertical tube, the horizontal air stream creating a partial vacuum above that tube. A sheet of paper held under the air stream from an electric fan will be supported horizontally by this same force. A very strong wind blowing over a tin-covered roof will sometimes tear off the sheet metal due to this same force.

Another form of this phenomenon is illustrated in the well-known experiment shown in Fig. 3. A disk *D* is secured to the end of a tube *T*, like a large flange. A second disk *d* with a pin *P* merely to keep it centered with the tube, is held beneath the first disk *D*. On blowing down through this tube the second disk *d* will be found to be held up, notwithstanding that the stream of air pushes it down in addition to gravity. The stream of air spreads out between the two parallel disks, and if the above explanation is correct, it tends to create a vacuum above and below it which forces the disks together; it should not operate in a vacuum. It is not true, as has been claimed, that the two disks must be of the same size; the lower one may be larger or smaller than the other.

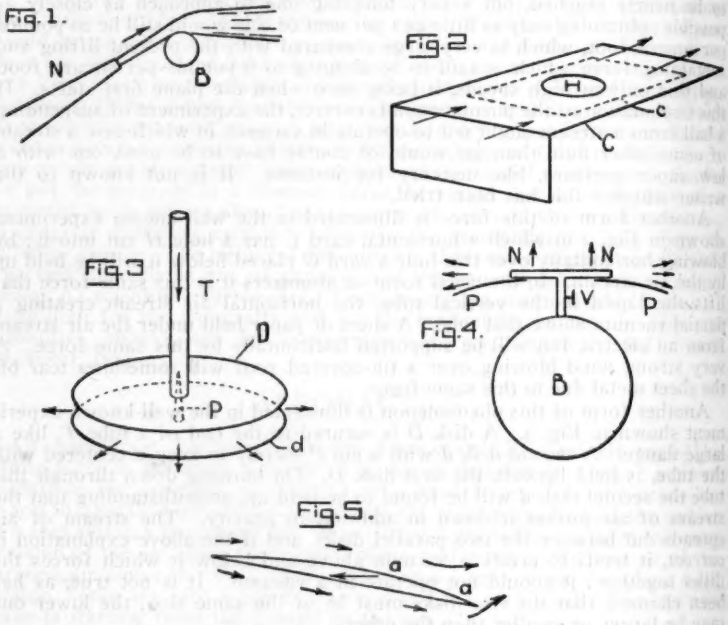
With such disks 4 inches in diameter, a ¼-inch bore tube, and by weighting the lower disk until it could barely be held up by blowing through the tube with the mouth, the writer obtained a sustaining pressure of about ⅓ of a pound per square foot. The actual sustaining force must have been still greater, as it had to react against the direct impact of the air stream through the tube. In a similar case, reported to the writer, in which this pressure was not wanted, and in which high air pressure was used and the two disks were held securely in place, this pressure became great enough to wrench the upper disk from the tube to which it was secured by graphite set screws; this shows the force to be quite great.

This experiment, however, is not an exact parallel one to the intended application of this force to airplanes, as the force sustaining the lower disk is in part reacted by a downward force on the upper side of the upper disk; the tube and its disk would no doubt weigh more when the lower disk was being held up by it. Applied correctly to airplanes there should be a plane below the stream but none directly above it.

In the modern biplanes, however, in which the stream of air behind the propeller generally passes between the upper and lower planes, the phe-

nomenon is similar to that in this experiment and no doubt an upward force of this kind exists on that part of the lower plane which is below the air stream, but a nearly equal downward force would probably be found to exist on the corresponding part of the upper plane, hence there would be little or no gain. It is quite likely that if the canvas were cut away in that part of the upper plane which is above the air stream, the upward force on the lower plane would be a net gain, at least when starting from rest. If so, it would be a curious case of increasing the lifting force by cutting away some parts of the present planes. But this would depend greatly on whether the shape and location of the lower plane is the most appropriate one.

To make this new force available in an airplane it is necessary to hang the weight onto the bottom of the air stream, as though the latter were a



SIMPLE EXPERIMENTS WITH A NEW LIFTING FORCE, AND A SECTION OF AN AIRPLANE WING.

sort of beam. This is done by adding a suitably shaped plane just below the air stream and secured to the framework of the airplane. This beam will be deflected downward by this weight, but this kind of a beam, depending for its stiffness on the inertia of the moving air, has the peculiar property that the force of a weight suspended from it will not be transferred back to the origin or support of the beam, namely, the propeller, notwithstanding the contrary opinion of those who claimed it was a case of "lifting yourself up on your boot straps." When a projectile fired from a gun strikes an inclined surface and is deflected, the side thrust deflecting it does not react on the gun.

As this point was raised by several physicists, the writer made the experiment shown in Fig. 4. *B* is a rubber bag containing compressed air. When the valve *V* is opened the air is discharged through the two diametrically opposite nozzles *NN* which are exactly in line with each other. The curved

planes *PP* were secured below these nozzles so as to be just below the air streams. The whole was suspended so as to be free to move in any direction. When the valve was opened the whole apparatus moved up. When the planes were put above the streams it moved down. When one was placed to the right and the other to the left of the stream, the whole apparatus revolved. This showed conclusively that there was no equal and opposite reacting force on the nozzle.

In principle, this method as applied to airplanes may be said to be lifting it by creating a partial vacuum above it, but in such a way that the corresponding downward force on this vacuum is sustained by the moving stream of air acting as a beam which is not supported by the airplane itself but by the inertia of the moving particle of air. The velocity of the air and its density, therefore, are important factors in the sustaining strength of this beam.

In physics this phenomenon is a consequence from what is known as the Bernoulli theorem, and it seems from this that this lifting force increases with the density of the material in the stream and with the square of the velocity. If this is correct this lifting force would increase rapidly with an increase of velocity of the air in the stream.

There is a very strong tendency of this force to produce oscillations in a flexible plane; it is this phenomenon which produces the flapping of the loose end of a flag in the wind. This tendency is so strong that a piece of apparatus carefully made of hinged links of sheet iron was instantly torn to pieces under a stream from a compressed air-chamber. Under the air stream of a propeller having only two blades the resulting pulsations in the air streams also gave rise to quite powerful tendencies to oscillate; so great were these oscillations that it was difficult to measure the average force.

The exact form of the curvature of a plane under an air stream to obtain the best results seems to be of considerable importance, as slight changes of curvature seem to change the results very decidedly. A perfectly straight plane gives very poor results. The air stream expands and is no doubt also drawn downward by the vacuum caused by the presence of such a plane; the correct shape of the plane seems to follow this curvature approximately; the plane should be sufficiently far from the stream to produce a partial vacuum between them, but should not be too far off to have this vacuum too easily broken by inrushes of air from the sides.

By moving such a plane through a range of angles this force will be found at first to increase as it approaches parallelism to the stream, then attains a maximum, and then reverses when the stream impinges directly on to it. The best shape seems to approximate that of the large end of a trumpet cut in half, though a recent test showed that the air stream a short distance from the propeller at first contracts slightly, hence the first part of the plane nearest the propeller should rise slightly at first and then bend downward. If extended too far along the length of the stream that component of this force which is in the opposite direction to the forward motion of the airplane may become too great.

Immediately below the propeller blades this suction force was found to increase very greatly, being of the order of magnitude of 12 to 15 pounds per square foot; but there were no means of measuring how much of this, if any, reacted downward.—*Scientific American*, 9/2.

SMALL ARMS FOR AERIAL USE.—*Tests Indicate U. S. Is Well Supplied with Best Types.*—Successful development of special types of small arms ammunition for use in aerial warfare is announced by the War Department. These include armor-piercing cartridges, incendiary cartridges and "tracers."

Bullets able to pierce steel became necessary when, in the early months of the war, both sides began to equip the vital parts of airplanes with light armor. "Tracer cartridges," leaving a trail of smoke, used to enable the

machine-gun operator to ascertain whether his shots are correctly aimed, and the incendiary bullets set fire to the contents of the enemy's fuel tank.

Recent tests, the announcement says, indicate that the United States has developed these types of special ammunition to a point fully equal or surpassing anything used abroad.—*Washington Evening Star*, 4/3.

VENEERED SPARS AND STRUTS.—It is a well-known fact that the present methods of applying silver spruce to aircraft construction are very wasteful, for nearly 50 per cent of the wood has to be cut to get the requisite degree of lightness for struts and spars. England is now suffering from a famine of woods suitable for aircraft, but particularly of silver spruce, and this famine is due as much to transport troubles as to the wastage inherent to aircraft manufacture. The rapid depreciation of service airplanes further contributes to render this problem a serious one.

To overcome these difficulties, which might eventually hamper aircraft supply, a British lumber concern has recently placed on the market hollow spars which are built up of thin veneers glued together to any desired section, strength, shape and length. No matter what the length of the desired spar may be, no scarfing or other joint is required, and uniform strength is given the spars over the entire length.

The same method is adopted for building up engine bearers and streamlined struts for interplane connection and undercarriages. These struts and spars are all reinforced in their interior construction in such a way as to give the greatest resistance to all stresses and strains without adding to the weight of the pieces.—*The Aeroplane* (London), 30/1.

THE ENGINES OF THE ZEPPELIN AND THE GOTHA.—Through the courtesy of the air board we are enabled to publish in what follows full particulars and illustrations of the "Maybach" motor, as used by the Germans in their Zeppelin airships, and of the "Mercédès" engine, as used by them in their Gotha aeroplanes. The information relating to the Maybach engine has been derived from a study of the motors of the German airship *S. L. 11* that was brought down in flames at Cuffley on September 3, 1916, by Lieut. W. L. Robinson, V. C. That that airship was of the Schütte-Lanz type and not a Zeppelin is, of course, now an accepted fact, but its Maybach engines were identical with those in use, or until recently in use, in Zeppelins. To what extent the design of these engines has since been altered we are unable to say. The Mercédès engine described is one of two recovered from the wreck of a three-seater Gotha biplane of the pusher type, brought down in Flanders last April.

The Maybach Engines of the Airship "S. L. 11."—Airship *S. L. 11* carried four independent "Maybach" engines arranged probably in four gondolas, one forward, one astern, and two abreast, amidships. Each drove an 18-foot two-bladed propeller, had six vertical water-cooled cylinders and developed, it is believed, about 200 brake horsepower at 1200 revolutions. Three of the engines were exactly similar in construction. The fourth was of the opposite hand, revolved in the opposite direction and probably drove the midship starboard propeller. Power was transmitted from the engines to the propellers through multiple plate clutches and reduction gear boxes. All four sets of reduction gearing were fitted with hand-operated band brakes, and two were provided with reversing mechanism. Parallel gearing was employed throughout the drive in the *S. L. 11* airship. In Zeppelin airships the propellers are carried in overhead brackets fixed to the hull framework, and are driven by bevel gearing and diagonal shafts.

The Cylinders.—The cylinders have a bore of 150 mm. and a stroke of 190 mm. The compression ratio is believed to be in the neighborhood of 6 to 1. Each separate cylinder—see Fig. 1—consists of a steel barrel or sleeve screwed at the top end into a cast-iron head piece containing the valves and extending downwards to form the water-jacket. The joint

at the lower end of the jacket is made by means of packing material—possibly rubber-covered copper wire—wound in a rectangular groove turned on the cylinder barrel. On the barrel being screwed into the head casting the mouth of the jacket passes over the upper flange of the turned groove and beds down on the packing material supported on the lower flange. In a spare cylinder carried by the airship the construction was slightly different, a plain joint being made in the cylinder head and a

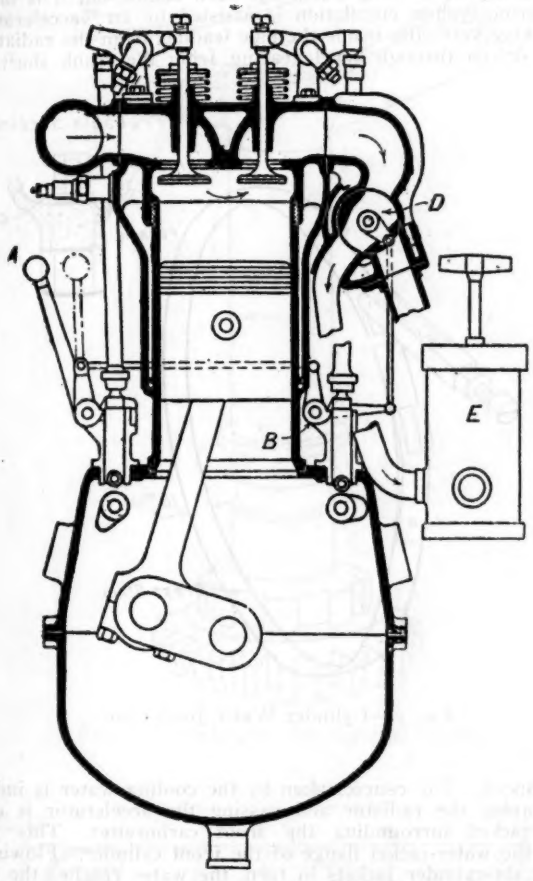


FIG. 1.—Cross-Section of Engine.

large union nut being employed to couple the foot of the jacket to the barrel.

The large circular joint in the head casting, shown facing the reader in the photograph of the wrecked engine reproduced in Fig. 19, establishes communication between the water-jacket and the jacket of the adjacent cylinder. The gap between the two adjacent flanges is not more than 10 mm. wide, and is filled up by a rubber and wire ring of approximately

square section surrounded by a band clip of sheet brass—see Fig. 2. When this clip is tightened up the rubber ring is contracted radially, and therefore forced to expand sideways, and so to make a water-tight joint between the two jackets.

Cooling Arrangements.—The circulation of water in the jackets is believed to be achieved by means of a thermo-syphon system working in conjunction with a large honeycomb radiator for each engine. No indication of the use of a water pump has been found, but it is understood that the thermo-syphon circulation is assisted by an "accelerator"—see Fig. 3—working vertically inside the pipe leading from the radiator to the engine and driven through bevel gearing from the crank shaft at twice

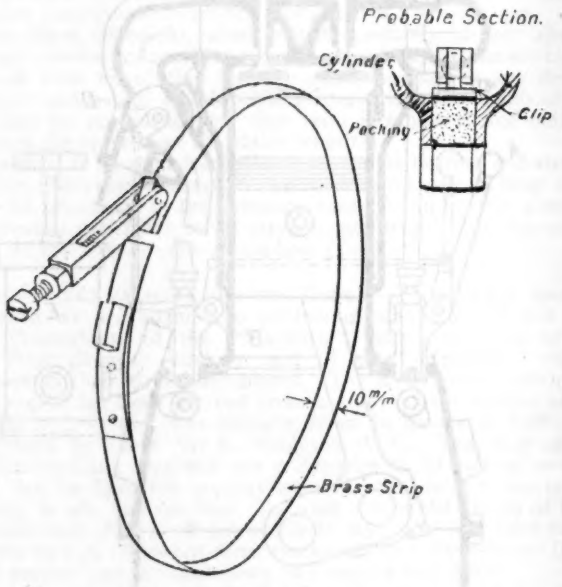


FIG. 2.—Cylinder Water Joint Clip.

the engine speed. The course taken by the cooling water is indicated in Fig. 4. Leaving the radiator and passing the accelerator it enters an aluminium jacket surrounding the front carburetter. This jacket is attached to the water-jacket flange of the front cylinder. Flowing thence through the six-cylinder jackets in turn, the water reaches the jacket of the rear carburetter attached to the water-jacket flange of the rear cylinder. It then flows back through a copper water-jacket surrounding the exhaust manifold pipe, and so returns to the radiator. The object of cooling the exhaust pipe is, we presume, to prevent the starting of an accidental fire—as by the contact of clothing or other inflammable material with it—or the ignition of hydrogen escaping from the envelope.

Considerable precaution is also taken to remove all chance of an explosion in the crank case. To this end, air is drawn into the crank case through six "breathers" of aluminium fixed along one side of the crank case and drawn out through six ports in the opposite side, as shown in

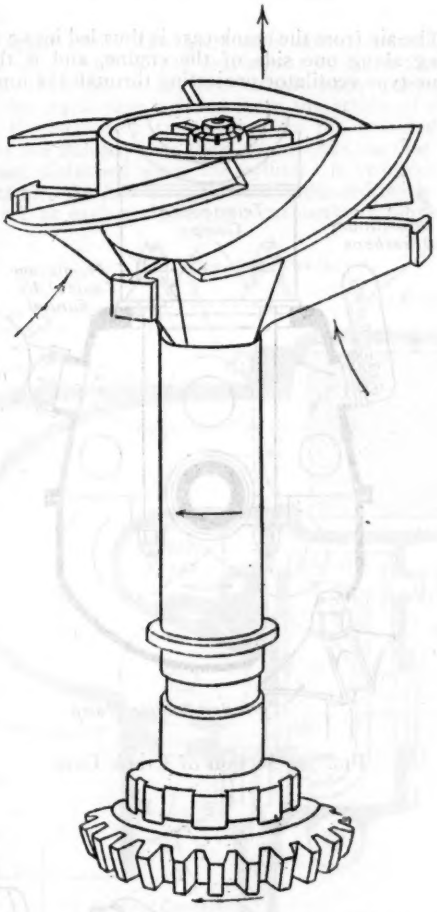


FIG. 3.—Accelerator for Cooling Water.

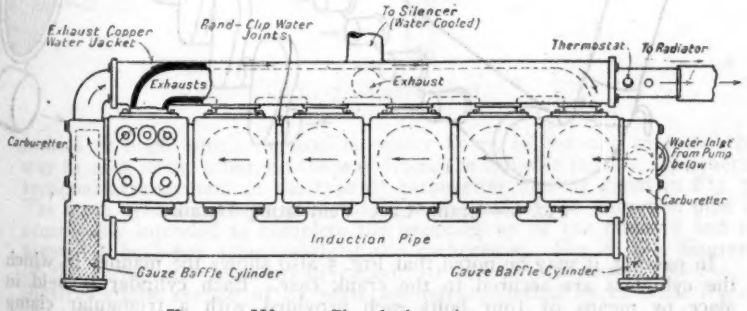


FIG. 4.—Water Circulation Arrangement.

Figs. 5 and 6. The air from the crank case is thus led into a sheet aluminium funnel extending along one side of the engine, and is thence drawn up through a marine-type ventilator projecting through the top of the gondola.

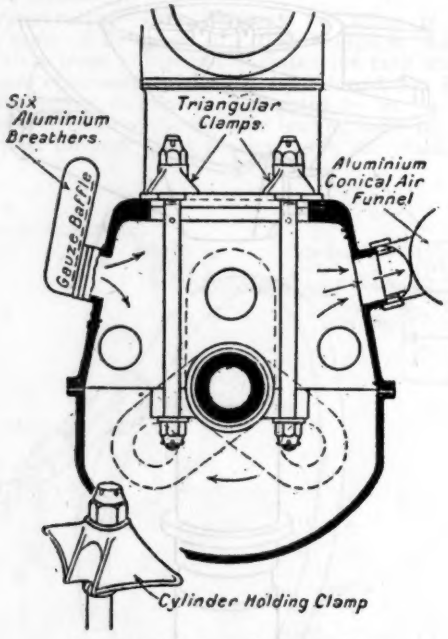


FIG. 5.—Section of Crank Case.

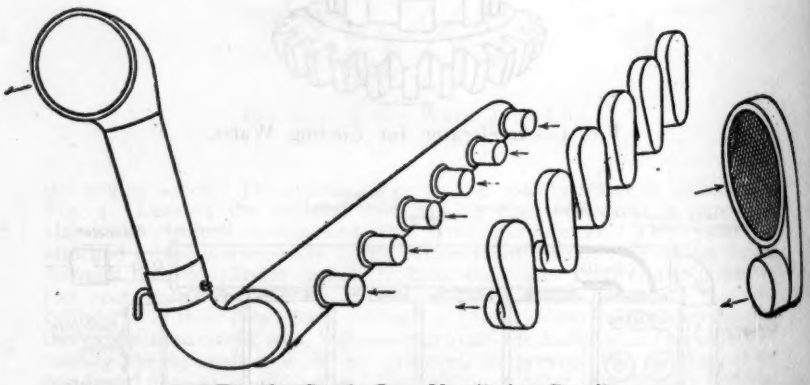


FIG. 6.—Crank Case Ventilating Details.

In passing, it may be noted that Fig. 5 also shows the manner in which the cylinders are secured to the crank case. Each cylinder is held in place by means of four bolts each provided with a triangular clamp

and nut at its upper end. The bolts pass downwards through holes in the webs of the upper half of the crank case and are thus made to hold in place the caps—inverted—of the crank shaft main bearings. In this way the material of the crank case is freed from the action of the tensile force existing during the explosion stroke between the cylinder and the crank shaft. The bolts are flanged near their upper ends, so that the crank shaft bearing cap is not disturbed when the cylinder is removed.

The Carburetters.—As has already been indicated, each engine is fitted with a carburetter at each end, the two carburetters being provided with

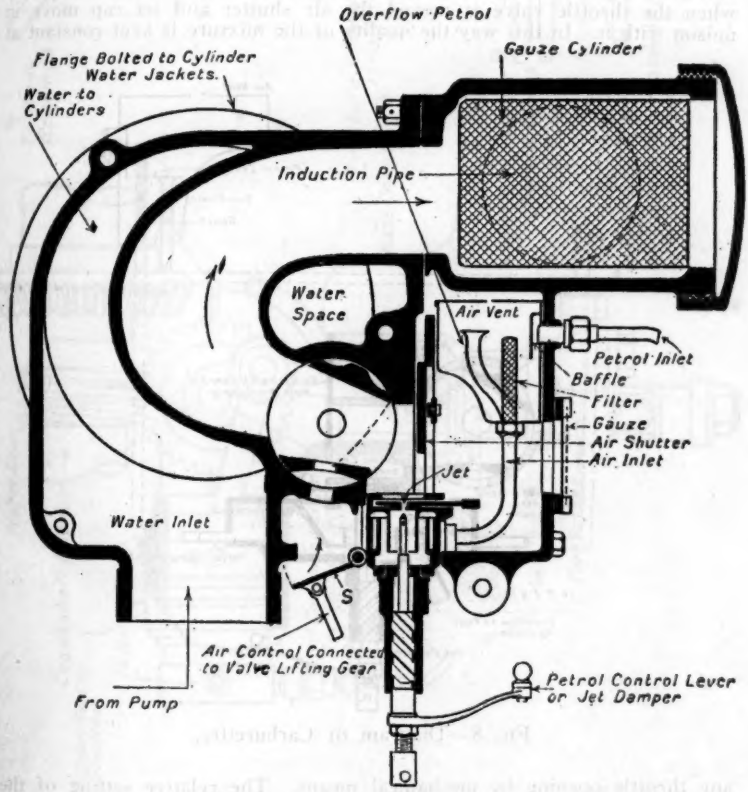


FIG. 7.—Carburetter.

jackets through which the cooling water flows, in the one case, on the way to, and, in the other, on the way from, the cylinder jackets. A general sectional arrangement of the type of carburetter used is given in Fig. 7. The large cylindrical wire-gauze baffle at the end of the induction pipe is presumably intended to complete the breaking up of the mixture and to prevent a back-fire from reaching the carburetter. Fig. 8 is a diagram of the carburetter intended to explain its internal structure, and Fig. 9 illustrates how certain of its parts are interconnected by external levers and links.

The carburetter is provided with a rotary throttle valve opening on one side—the right in Figs. 7 and 8—to a mixing chamber, and on the other, to the inlet pipe. In the lower portion of the valve is a large port registering with a hole in the casing, which hole is controlled by a shutter *S*, for a purpose to be referred to later. The main air supply to the mixing chamber is regulated by a guillotine shutter. The fuel is delivered through a hole in the carburetter casing over which fits a cap in which an excentric orifice is drilled. By the rotation of the cap the available area of the jet hole can be increased or diminished. As indicated in Fig. 9, the throttle valve, air shutter and jet cap are connected together in such a way that when the throttle valve is moved the air shutter and jet cap move in unison with it. In this way the quality of the mixture is kept constant at

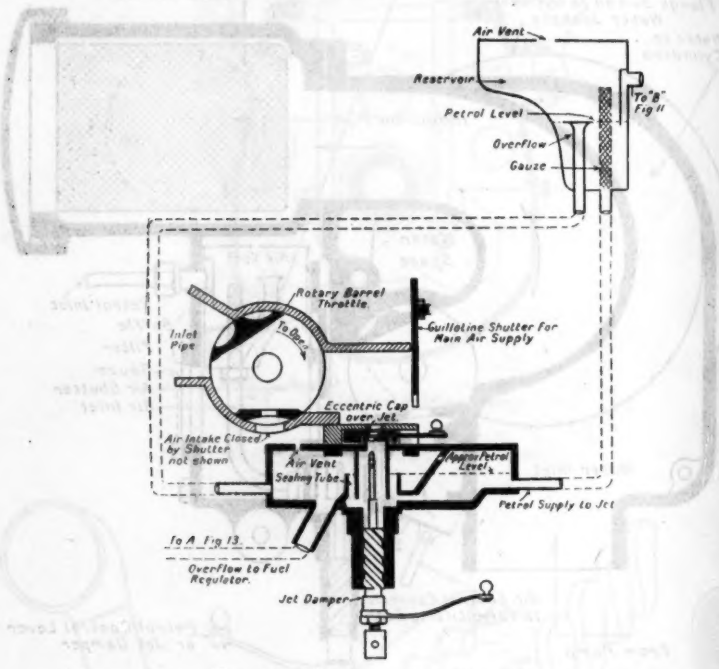


FIG. 8.—Diagram of Carburetter.

any throttle opening by mechanical means. The relative setting of the three interconnected items can be adjusted by altering the lengths of the links and lever arms, as indicated in Fig. 9.

It will be noticed that the usual float chamber is not embodied in the design of the carburetter. The reason for this is that the feed with a float chamber is affected by change of atmospheric pressure. Instead of a float chamber, a reservoir—see Fig. 8—is provided at a short head above the jet hole, into which reservoir petrol is delivered by a pump. Passing through a gauze filter the fuel descends into the jet box, a vessel divided into two chambers by a diagonal wall. At the base of this wall is a passage leading the petrol into a short, wide sealing tube, while at the top of the wall is an air vent opening into the second chamber. A tube open at the lower end and concentric with the jet orifice depends from the top

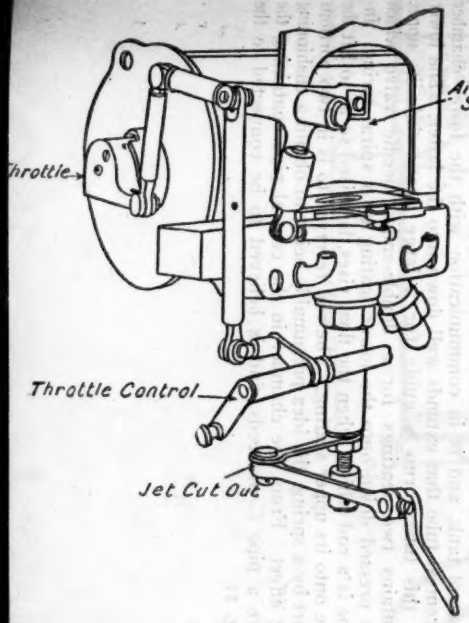


FIG. 9.—Interconnected Levers of the Carburetter.

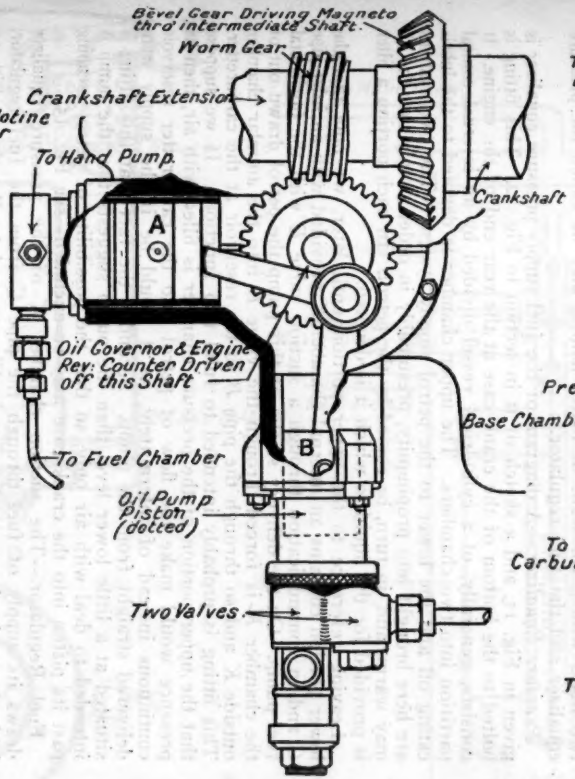


FIG. 10.—Fuel and Oil Pumps.

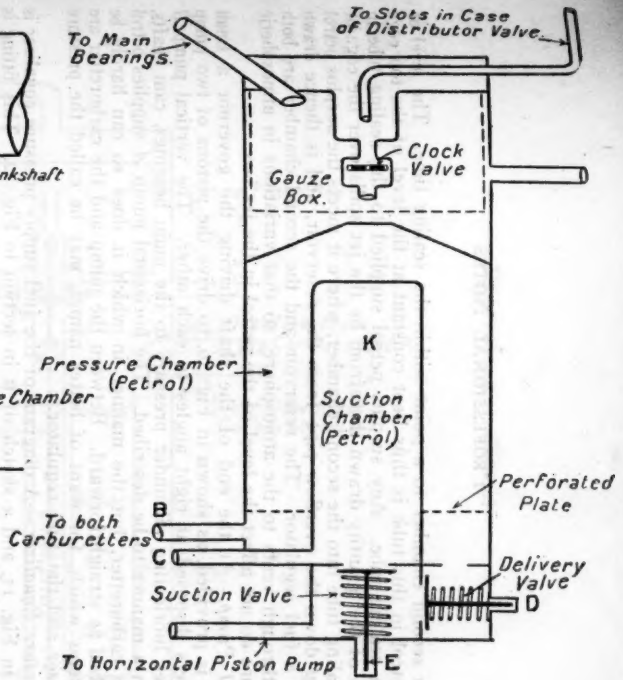


FIG. 11.—Diagram of Pressure Equalizer.

of the second chamber to a point within the sealing tube. The level of the petrol in this tube is thus kept constant at the level of the top edge of the sealing tube. Any surplus petrol supplied to the sealing tube in excess of the quantity drawn therefrom by the jet spills over the edge of the sealing tube into the second chamber, where it meets the surplus petrol coming down the overflow pipe from the reservoir, and is thence drawn off to a fuel regulator. The reservoir and the second chamber are both open through vents to the atmosphere, so that variations in atmospheric pressure do not affect the level of the petrol in the jet box.

Fuel Pump.—At the end of the shaft driving the governor a small crank is provided, as shown in Fig. 10, to drive the pistons of two pump cylinders disposed at right angles to each other. The vertical pump *B* supplies lubricating oil under pressure to the main bearings, cam shafts, etc., in a manner to be described. The horizontal pump *A* supplies petrol to the carburetter, but the manner in which it does so can hardly be described as straightforward. Between the pump and the carburetter are two items which, for want of better names, may be called the pressure equalizer and the fuel regulator.

Pressure Equalizer.—A diagram of the fuel supply pressure equalizer is given in Fig. 11, and a sketch of it in section in Fig. 12. This fitting is bolted to the bottom of the crank case at the rear end of the engine. It consists, generally, of a cylindrical vessel divided by an internal conical partition into two chambers. The upper chamber is devoted to the lubricating oil and the lower to the petrol supply system. The two systems are here brought into propinquity, presumably in order simply that the oil may warm, and, in turn, be cooled by the petrol. In each portion a filter is provided for the liquid to which it is devoted.

Leaving reference to the upper portion until later, we note that the lower portion contains an internal chamber *K* provided with an inlet pipe *C* and in communication through a suction valve *E* with the horizontal fuel pump. On the delivery stroke of this pump the petrol drawn out of the chamber *K* is forced through the valve *D* into the annular chamber outside *K* and so through the pipe *B* to the reservoir at the carburetter. This fitting is probably intended to fulfil two functions. If we suppose that the upper portion of the pressure chamber is filled with air, then its presence would make the flow of petrol into the carburetter reservoir continuous instead of intermittent, as it would be if the supply were delivered straight from the pump. Secondly, the fact that this fitting is situated at a little lower level than the pump suggests that the pump is intended to deal with air only, so that the possibility of petrol escaping past its piston into the crank case may be excluded—see Fig. 15.

Fuel Regulator.—The suction chamber *K* of the pressure equalizer draws its supply of fuel through the pipe *C* from the fuel regulator. This device is shown in diagram in Fig. 13, and by the sketch Fig. 14. It consists of a cylindrical tank divided into two chambers, and is carried well below the level of the carburetters. The upper chamber is fed from the main petrol tank, and is in communication with the lower chamber through a central tube that extends well down into the latter. The lower portion of this tube forms a guide for a large float, while its upper portion contains two seatings for a double-ended needle valve which normally is pressed down onto the lower seating by a spiral spring. Inside the tube is a rod which, when the float rises, is raised so as to lift the needle valve onto its upper seating. The rod referred to is in two portions pressed apart by a spring, the idea presumably being to obtain a cushioning or delaying effect. From the chamber in the central pipe containing the needle valve a pipe *C* proceeds, and is believed to be connected to the pipe *C*, Fig. 11.

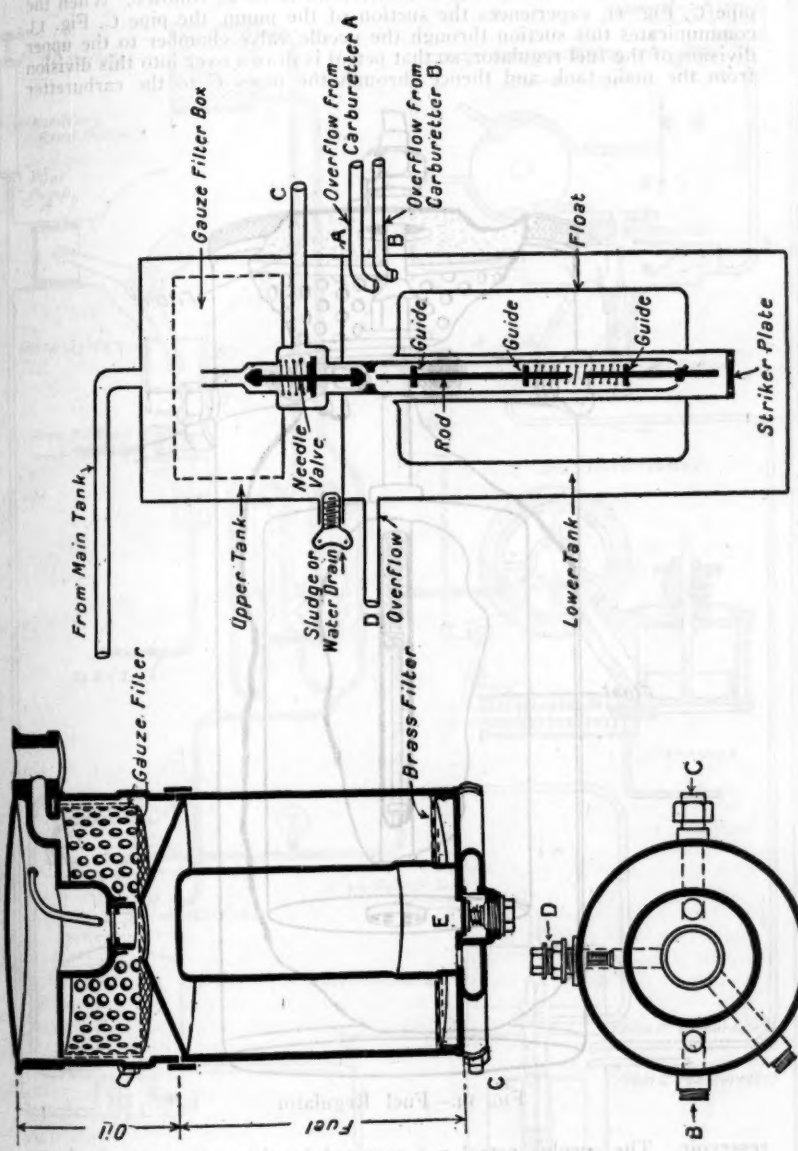


FIG. 13.—Diagram of Fuel Regulator.

FIG. 12.—Pressure Equalizer.

The operation of this device is understood to be as follows: When the pipe *C*, Fig. 11, experiences the suction of the pump, the pipe *C*, Fig. 13, communicates this suction through the needle valve chamber to the upper division of the fuel regulator, so that petrol is drawn over into this division from the main tank and thence through the pipes *C* to the carburetter

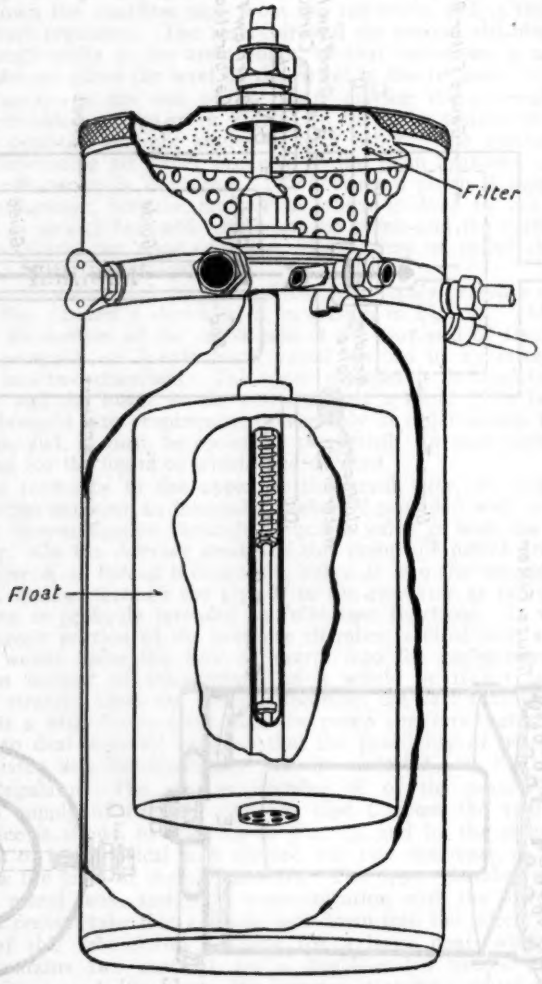


FIG. 14.—Fuel Regulator.

reservoir. The surplus petrol not required by the engine returns from the carburetter in the manner already described, and flows back through the pipe *A* or *B* to the lower compartment of the fuel regulator. When sufficient has thus been admitted to that compartment, the float rises and pushes the needle valve on to its upper seating, so that the suction of the

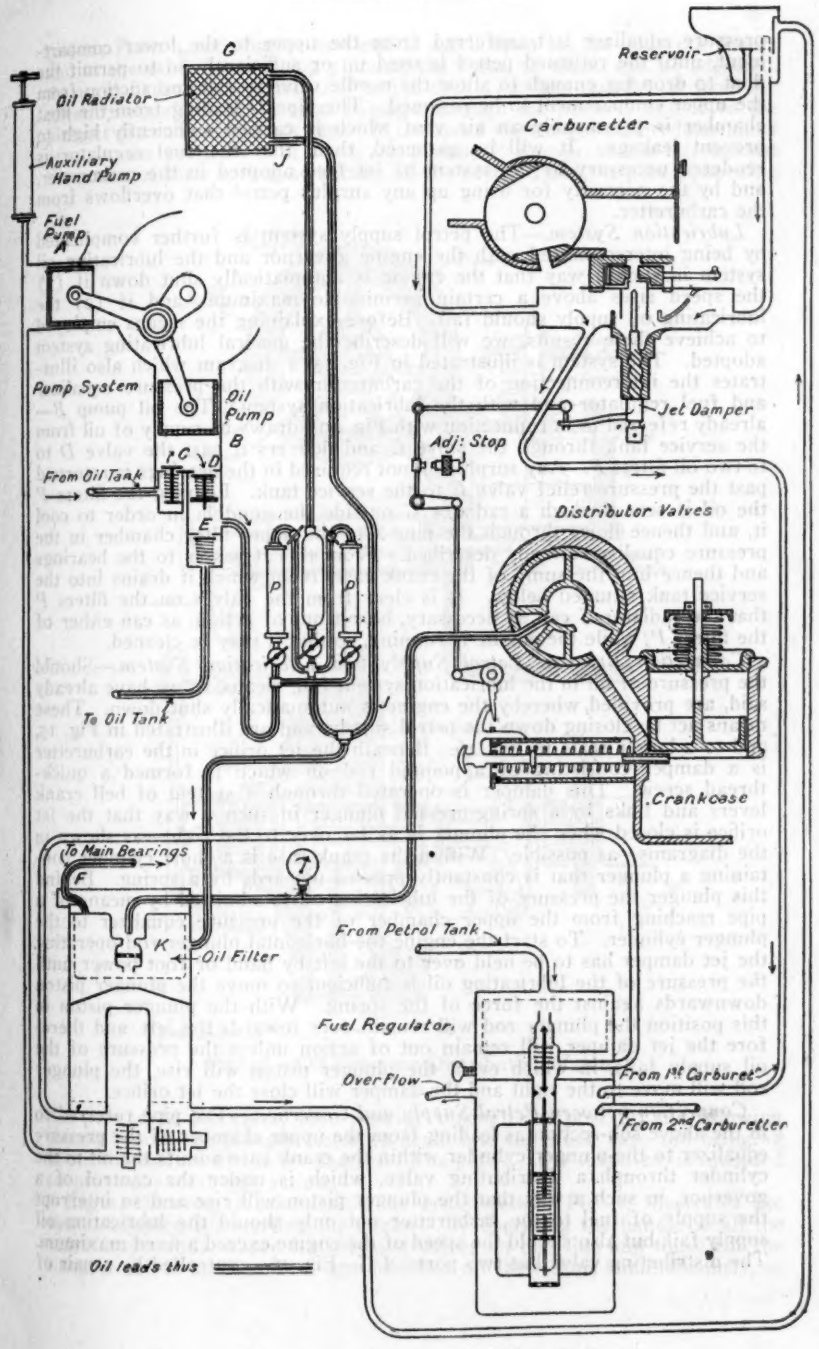


FIG. 15.—Diagram of Petrol and Oil Supply Systems.

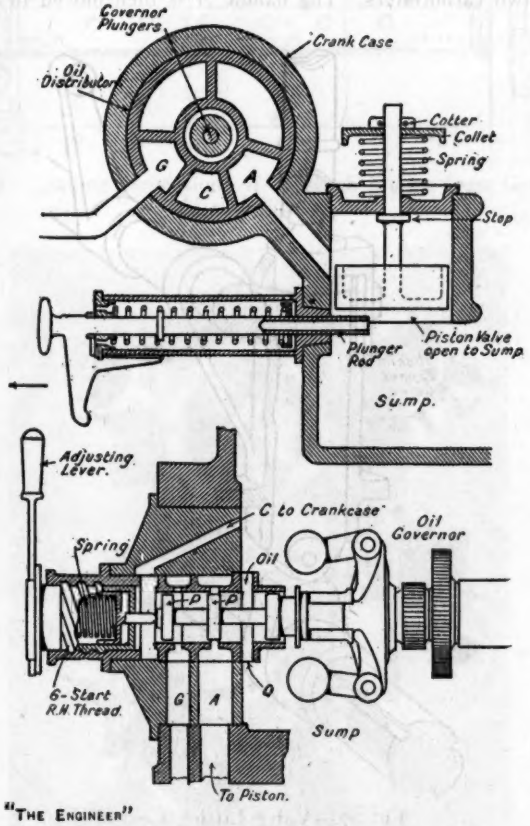
pressure equalizer is transferred from the upper to the lower compartment, until the returned petrol is used up or sufficiently so to permit the float to drop far enough to allow the needle valve to fall and suction from the upper compartment to be resumed. The pipe *D* leading from the float chamber is presumably an air vent which is carried sufficiently high to prevent leakage. It will be gathered, then, that the fuel regulator is rendered necessary by the system of jet feed adopted in the carburetter, and by the necessity for using up any surplus petrol that overflows from the carburetter.

Lubrication System.—The petrol supply system is further complicated by being interconnected with the engine governor and the lubricating oil system in such a way that the engine is automatically shut down if (1) the speed rises above a certain permissible maximum, and if (2) the lubricating oil supply should fail. Before explaining the means employed to achieve these results, we will describe the general lubricating system adopted. The system is illustrated in Fig. 15, a diagram which also illustrates the interconnection of the carburetter with the pressure equalizer and fuel regulator and with the lubrication system. The oil pump *B*—already referred to in connection with Fig. 10—draws its supply of oil from the service tank through the valve *C* and delivers it past the valve *D* to to two oil filters *P*. Any surplus oil not required in the bearings is returned past the pressure relief valve *E* to the service tank. Leaving the filters *P* the oil is sent through a radiator *G* outside the gondola in order to cool it, and thence flows through the pipe *J* to the upper filter chamber in the pressure equalizer already described. From this it passes to the bearings and thence into the sump of the crank case, from which it drains into the service tank situated below. It is clear from the valves on the filters *P* that the radiator *G* can, if necessary, be cut out of action, as can either of the filters *P*, while the engine is running, so that it may be cleaned.

Connection Between Petrol Supply and Lubrication System.—Should the pressure of oil in the lubrication system fail, means, as we have already said, are provided whereby the engine is automatically shut down. These means act by closing down the petrol supply, and are illustrated in Fig. 15, and to a larger scale in Fig. 16. Beneath the jet orifice in the carburetter is a damper consisting of a pointed rod on which is formed a quick-thread screw. This damper is operated through a system of bell crank levers and links by a spring-pressed plunger in such a way that the jet orifice is closed when the plunger is as far over to the right—as shown in the diagrams—as possible. Within the crank case is a short cylinder containing a plunger that is constantly pressed upwards by a spring. Behind this plunger the pressure of the lubricating oil is admitted by means of a pipe reaching from the upper chamber of the pressure equalizer to the plunger cylinder. To start the engine the horizontal plunger rod operating the jet damper has to be held over to the left by hand or foot power until the pressure of the lubricating oil is sufficient to move the plunger piston downwards against the force of the spring. With the plunger piston in this position the plunger rod will remain over towards the left, and therefore the jet damper will remain out of action unless the pressure of the oil supply falls, in which event the plunger piston will rise, the plunger rod will move to the right and the damper will close the jet orifice.

Connection between Petrol Supply and Governor.—The pipe referred to in the above sub-section as leading from the upper chamber of the pressure equalizer to the plunger cylinder within the crank case admits the oil to the cylinder through a distributing valve, which is under the control of a governor, in such a way that the plunger piston will rise and so interrupt the supply of fuel to the carburetter not only should the lubricating oil supply fail, but also should the speed of the engine exceed a fixed maximum. The distributing valve has two ports *A G*—Fig. 16—controlled by a pair of

pistons P on a rod that at one end is acted upon by the governor levers and at the other by a spring plunger, the force of which can be adjusted. At normal speeds the pistons P P are in such a position that the oil from the pressure equalizer has a clear passage through the ports G and A to the plunger piston in the crank case. If the speed rises beyond a predetermined amount, the governor will move the pistons P P over to the left against the action of their spring, so cutting off the port A from the port G, opening



"THE ENGINEER"

FIG. 16.—Oil Pressure Distributing Valve.

the port A to the crank case interior through the port Q, and allowing the oil behind the plunger piston to drain into the crank case and bringing about the closure of the jet damper. The port C, it is surmised, is intended to prevent a dash-pot action.

Engine Starting Mechanism.—The cross-section, Fig. 1, illustrates the means adopted for starting the engine. By operating the handle A all the valve tappet rods—those for the inlet valves on one side and those for the exhaust valves on the other—can be lifted off their cams simultaneously, so

that all the valves can be held open. Fig. 17 indicates how this result is produced. The handle *A*, Fig. 1, operates, on each side of the engine, a shaft on which lips are formed to catch under small projections on the sides of the valve tappets. The movement of the handle *A* also partially rotates the barrel valve *D*, Fig. 1, in the exhaust manifold, thus closing the exhaust passage to the silencer and opening it to a secondary outlet pipe leading to a large suction hand-pump *E*. All the valves being open, the operation of this hand-pump draws in gaseous mixture into the cylinders from the two carburetters. The handle *A* is then moved to restore the

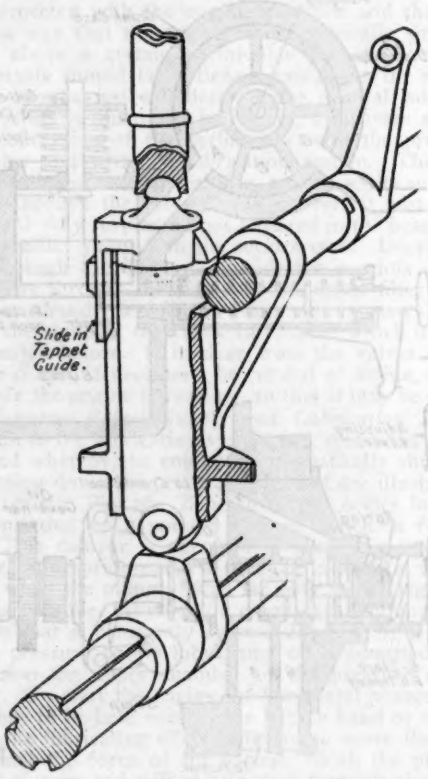


FIG. 17.—Valve Lifting Gear.

inlet and exhaust valves and the valve *D* to their normal setting, whereafter ignition is caused in those cylinders that are just over the compression stroke by means of a geared-up Bosch hand-starting magneto. The shutter *S*, Fig. 7, on the carburetter casing is connected with the valve lifting gear, so that additional air may be admitted to the cylinders when the engine is being started.

Ignition.—Ignition is normally effected by means of two Bosch magnetos driven by bevel gearing off the crank shaft. Two Bosch sparking plugs are fitted to each cylinder, one on each side of the combustion chamber directly below the valves.

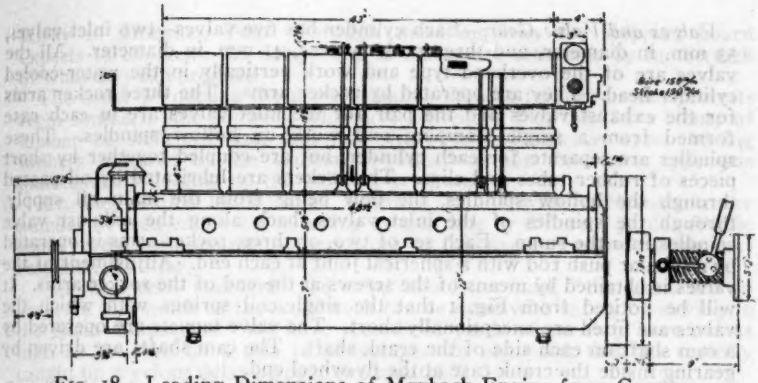


FIG. 18.—Leading Dimensions of Maybach Engine from German Airship *S. L. 11.*

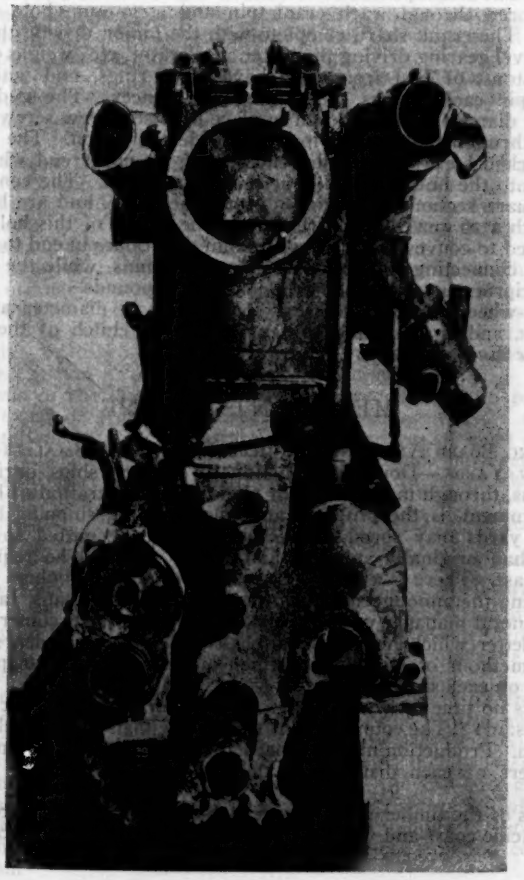


FIG. 19.—Wrecked Maybach Engine.

Valves and Valve Gear.—Each cylinder has five valves—two inlet valves, 53 mm. in diameter, and three outlet valves, 41 mm. in diameter. All the valves are of the overhead type and work vertically in the water-cooled cylinder head. They are operated by rocker arms. The three rocker arms for the exhaust valves and the pair for the inlet valves are in each case formed from a single stamping and work on hollow spindles. These spindles are separate for each cylinder, but are coupled together by short pieces of rubber tubes and clips. The rockers are lubricated by oil passed through the hollow spindles, the flow being from the main oil supply, through the spindles of the inlet valves, back along the exhaust valve spindles into the sump. Each set of two, or three, rocker arms is operated by a tubular push rod with a spherical joint at each end. Adjustment of the valves is obtained by means of the screws at the end of the rocker arms. It will be noticed from Fig. 1 that the single-coil springs with which the valves are fitted are exceptionally short. The valve tappets are operated by a cam shaft on each side of the crank shaft. The cam shafts are driven by gearing inside the crank case at the fly-wheel end.

Miscellaneous.—The leading dimensions of the engine are given in Fig. 18. The six-throw crank shaft has seven plain bearings each 66 mm. in diameter. The crank pins have the same diameter as the journals. A 36 mm. hole is bored through each crank pin and a 40 mm. hole through the journals. The crank shaft, complete with the pinion driving the cam shaft and the bevel gearing driving the water accelerator, etc., weighs 99¼ pounds.

The pistons, of cast iron, each have three rings, and with rings and gudgeon pin each weighs 10 pounds 13½ ounces. The gudgeon pin is 38 mm. in diameter and is locked in place by a set-screw screwed vertically upwards through the pin and its boss inside the piston. The set-screw in turn is locked by a split pin driven through its upper end where this end projects into the hollow interior of the gudgeon pin. The connecting-rods are of square section, measuring 33 mm. each way, and are bored up the center with a 26 mm. diameter hole. At the center of this hole an 11 mm. pipe is fixed to convey lubricating oil from the crank pin end to the gudgeon pin. The connecting-rods each weigh 10¾ pounds, while the total weight of the reciprocating parts per cylinder is 14¾ pounds.

The fly-wheel is a steel casting 19½ inches in diameter and weighing 67 pounds, and is connected to a multiple disc clutch of the Hele-Shaw type.—*The Engineer*, 22/2.

MERCHANT MARINE

SHIPPING BOARD ANNOUNCES BUILDERS MAY USE SMALLER TIMBERS IN SOUTHERN YARDS.—Double production of wooden ships during the next six months, through modification of plans and co-operation of builders with the government, is the program announced by the shipping board. That southern yards may speed work, they will be permitted to use smaller timbers than originally specified and which still will be required on the Pacific coast. There is a serious scarcity of the large timbers in the south.

Following the announcement of this modification in plans, James O. Heyworth, general manager of the division of wooden ship construction, made public a letter which he had sent to all builders of wooden ships, calling for new methods of building by which more men can be employed simultaneously on each ship.

"This is no time to work on the old basis for wooden ship construction," the letter said: "The country needs ships more than anything else. We must have them. Production must be speeded up. Real co-operation between the shipbuilders of each district can double our production in the next six months."

Surveys of the timber resources available for shipbuilding are being made on the Pacific coast and will be commenced in the south at once by John H.

Kirby of Houston, Tex. Through these inquiries the shipping board expects to eliminate the delays due to inaccurate estimates by lumbermen of what they can produce.

The order permitting the use of smaller timbers follows urgent protests from southern pine growers, who have contended that they have plenty of lumber of sufficient size, and that the board's insistence upon the big timbers required by the original specifications for the Ferris type was unnecessarily holding up the building program.

Mr. Heyworth's letter called attention to the wide difference in the number of men employed on a ship at one time by different yards. While some yards work 400 men, others work as few as 125, progress being correspondingly slow.

"In the Ferris standard type ship," the letter said, "the plans are so accurate that much of the woodwork can be done with safety by sawing to the exact dimensions. We have records of yards where they have put as high as 500 men on a ship to advantage. In one yard, this has recently caught up previous delay by over two months."

Architects of the shipping board are now engaged in designing a modified Ferris type ship, contracts for 150 of which will be awarded to gulf coast builders as soon as ways are available. Southern pine manufacturers, in conference with officials of the board, pledged the industry to produce timbers for at least 300 of the modified Ferris ships a year, in addition to schedules on which the mills are now working.

Representatives of the Southern Pine Association said the change promises to speed up the building program tremendously.—*Washington Evening Star*, 14/3.

NON-SINKABLE "LUCIA" MAY FAIL OF APPROVAL.—Naval experts anticipate an unfavorable report from the board, headed by Rear Admiral Albert G. Winterhalter, which has just completed tests of the former Austrian steamer *Lucia*. That vessel has been equipped with interior "buoyancy boxes" designed to make her unsinkable.

That the ship will remain afloat after receiving injuries which would sink a craft of ordinary construction is conceded. Constructors are, however, of opinion that the "buoyancy boxes" would not prevent a torpedo damaging the vessel to such an extent that she would be of no further value as a supply ship or cargo carrier. In taking that position naval engineers indorse the decision already reached by the shipping board.

Proponents of the "buoyancy box" idea are expected to press for its adoption in case of army transports, holding that even if the vessel when torpedoed settled until her decks are awash, the lives of most of those on board still would be protected. It is not believed, however, that this advantage will impress navy constructors sufficiently to win their indorsement.

The Winterhalter board is now preparing its official report for Secretary Daniels.—*Evening Star*, 12/3.

CONCRETE SHIPS MAY BE SOLUTION OF PROBLEM.—Concrete ships are claiming a large share of public attention and of the attention of officials of the shipping board. Both the public and officials see in them a possible solution of the shipping problem—solution of which through the building of steel and wooden vessels is a steadily diminishing hope.

This interest has been heightened by the launching recently on the Pacific coast of a 5000-ton concrete vessel, built for private owners. The shipping board has authorized three concrete vessels of 3500 tons each, but successful launching of the larger ship claimed instant attention.

Chairman Hurley telegraphed the builders of the big hull, asking them to report at once what the prospects were for construction of additional vessels and what time would be required. An unofficial report said the launching had strengthened belief that concrete construction could be depended upon.

Chairman Hurley's telegram requested also that there should be an early test of the vessel to settle the question as to her strength and behavior in a heavy sea. An important point to be decided before large-scale construction of concrete ships will be approved by the government is what will be the effect of salt water on the concrete and the steel reinforcement.

Designs for the four 3500-ton concrete ships authorized by the shipping board have been about completed and their construction is to begin soon. —*Washington Evening Star*, 16/3.

UNSINKABLE MERCANTILE SHIPS.—To the ordinary peace-time circumstances under which ships were most usually lost—that is, by collision or by running ashore—there have, in the last three years, been added the extraordinary risks of fatal damage by mine or torpedo. In the course of the first year or two of war this danger was regarded as so abnormal that comparatively little notice was attracted to the sinking of merchant vessels, but during the last 12 months the losses in the mercantile marine have grown to such ominous proportions that it is hardly surprising to find in many quarters the old, old cry for unsinkable ships revived. Prior to the introduction of iron for shipbuilding comparatively little was heard of such a demand. A wooden battleship or frigate would float after a most merciless hammering, for the majority of the damage was inflicted on her upper structure; whilst a wooden ship that ran ashore was hardly ever expected to survive. But with the introduction of iron, and the rapid development of knowledge of naval architecture which accompanied it, the problem of the unsinkable ship came rapidly to the forefront. It has not yet been solved in practice, in spite of the frequently recurring claims that such a vessel has been produced. Probably the loss of the *Titanic*, owing to an accident of an unparalleled nature, did more towards raising doubts as to the invulnerability of even the most carefully constructed vessel, than has any other accident at sea. Everything that could reasonably be done by the builders had been done with the intention of securing flotability, but as the result of an extraordinary collision the vessel sank in four hours. All the experience gained through the loss of the *Titanic* was directed towards rendering her larger successor—the *Britannic*—immune from similar danger, but even the improvements introduced into her did not prevent her loss by torpedo from a German submarine. One may well ask therefore whether it is really possible to build an unsinkable ship.

The answer must undoubtedly be that, with our present knowledge of naval construction, and with the materials that we have at our command, it is possible to do so, but that such a vessel would hardly come into the category of practical ships, and that, even with such a prohibitive reservation, the safety would still be dependent on the human element. Relative safety is quite another matter, and modern scantlings and subdivision are laid down or legislated for on the basis of a vast fund of experience. The columns of the scientific societies bristle with claims and designs for so-called "unsinkable" ships, but acts of God or the malice of the king's enemies are seldom considered by their authors. No question of subdivision or structural strength, for instance, will ever eradicate the ever possible risk of fire on board, and though nowadays such an accident is of the rarest occurrence it is perhaps the most cogent practical argument for loading the upper decks of passenger vessels with boats and life rafts capable of holding every person on board. Against the extraordinary risk of torpedoes it is hardly worth while increasing protection over and above the existing arrangements, but even if they were increased it is impossible to conceive, within reason, a form of construction that would withstand the explosion from a torpedo of a greater size or capacity than those now in use. Increasing a 21-inch weapon to 27-inch or 30-inch would enable an enormously greater charge to be carried, and it is quite impossible to see how any ship could withstand it. Herein must inevitably be found the answer to the battleship with armored submerged surfaces so often put

forward. The only really practicable method of securing a greater degree of flotability than exists at present is by increasing the amount of subdivision. Mere increase of scantlings would absolutely fail to produce any better result, but if the two methods are combined a certain degree of superiority would possibly be attained at the overwhelming disadvantage of additional weight and cost of hull, reduced cargo capacity, greater difficulty of loading and unloading, and many other disadvantages depending on the design and dimensions of the vessel it is proposed to improve. Even if strength and increased cellular construction be adopted, it is extremely doubtful if the additional flotability secured would be more than sufficient to delay the foundering of a vessel struck by a torpedo. The grave difficulty in the way of further subdivision lies in the arrangements required in the machinery spaces. Longitudinal subdivision is almost essential if any greater degree is to be provided, and it would generally interfere very seriously with the positions of boilers. In the majority of mercantile vessels the boilers occupy the whole available width of the stokeholds, which usually stretch from side to side of the vessel. To add side longitudinal bulkheads, even if the side compartments were utilized for coal storage, would involve a prohibitive lengthening of the boiler rooms to accommodate the number of boilers required, and we have already seen in the cases of the *Lusitania* and *Britannic* that even this precaution is insufficient. External excrescences on the side of a ship are often suggested. They add greatly to the resistance, cause serious inconvenience when docking, even if they do not entirely prevent the use of certain dry docks or harbor entrances, and unless they form an integral and fixed portion of the structure, are liable to damage at sea. The use of torpedo nets is unsuitable, on account of the facts that they reduce the speed of a ship, and that in the merchant service crews are not carried in sufficient quantity to enable them to be handled with the requisite facility. Much increase in subdivision renders the conveyance of cargoes, such as locomotives, steel rails, or similar items requiring length or bulk in the holds, a matter of considerable difficulty. Moreover, any considerable increase in number of spaces greatly augment the amount of space wasted, as equally close storage cannot be obtained under the circumstances.

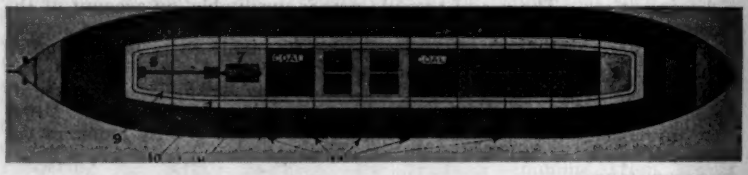
The fact is that the problem of the unsinkable ship is a most unprofitable one from the practical point of view. The Bulkhead Committee, which was sitting before the war, went as far as it was reasonably possible to do, having all the facts based on experience to guide it, and beyond limiting the relative sizes of compartments, and the height and strength of bulkheads, it recommended nothing which could by any stretch of imagination be twisted into a plea for unsinkability. Its provisions took into account all the risks of the sea experienced during peace-time conditions, and did not legislate for mines or torpedoes, particularly when used in defiance of international law. The true remedy in this case is not to alter the vessel at all, but, as far as possible, to see that the risks incurred are a minimum; in other words, to prevent the damage being done, and not to attempt to adopt doubtful methods to palliate their effects.—*Engineer*, 1/2.

A SHIP WITHIN A SHIP.—The Italian merchant marine is not sufficiently numerous to withstand many losses without suffering a very serious diminution. Not long ago a hostile submarine sent the *Milazzo* of 11,477 tons gross to the bottom. The ship was put in service as recently as 1916, and marked a notable departure in bulk cargo freighters. Similarly, a U-boat, a short while back, sent to her grave the *San Guglielmo*, of 8341 tons gross, of the well-known Sicula-Americana Line. Thus the enemy under-water craft have been making dire inroads upon Italy's ships of commerce. It is, therefore, easy to realize just why the government appointed a special committee to consider plans for types of ocean-going merchantmen better able to withstand torpedo attack.

It has recently been announced that this committee has concluded its work after deciding upon a design capable of meeting the specified requirements and susceptible of speedy construction upon standardized lines. Just what the nature of this type is has not been disclosed, but, in all likelihood, it is probably that developed by Naval Constructor Umberto Pugliese, which occasioned a great deal of favorable comment in Italian technical journals a few months ago. Accordingly the following particulars about the Pugliese anti-submarine freighter should be of present interest.

The whole problem of how best to neutralize the ravages of the U-boat has been investigated at some length both here and abroad, and the plans offered may be broadly divided into two classes. The first involved protective features that curtailed the cargo-carrying capacity, while the second, because of greater speed of construction and comparative simplicity of design, promised more numerous fleets, able to transport full cargoes, and thus offsetting by numbers the net sacrifices. In other words, the first class, although damaged, would probably be able to make port; those of the second class, being without structural defence, would in all likelihood sink if hit, but enough of them would get through to strike a fair average in the matter of freight delivered.

Italy, with her limited deposits of iron ore and her dependence in the main upon imported coal, is extremely hampered in the matter of domestic steel, and on that account her designers have sought to meet this situation, now that it is so difficult to obtain structural materials abroad, by evolving a defensive type of merchantman that would in this way minimize the effect



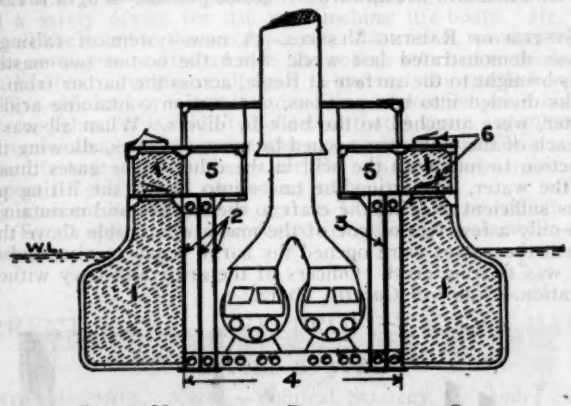
CROSS-SECTIONAL VIEW OF THE DOUBLE-HULLED SHIP.

1. Primary cargo spaces. 2. Longitudinal bulkheads. 3. Principal defensive longitudinal bulkhead. 4. Span of double bottom. 5, 5. Fore-and-aft passage. 6. Cargo hatches and gas vents.

of the foe's submarine activities. In brief, the controlling keynote in the elucidation of the problem for the Italians has been that of most practical conservation. Engineer Pugliese has taken as a basis for his design the familiar cargo type known to the shipping world as the "turret" steamer—really an improved order of the whaleback vessel which originated in the United States in the early "nineties." Internally, however, the Italian naval architect has made changes which he is confident will greatly reduce the menace both of the submarine mine and the automobile torpedo. His plan calls for cargo carriers ranging from 10,000 to 12,000 tons displacement, of 10 to 12 knots, capable of transporting from 4500 to 5500 tons of freight, respectively. The 10,000-ton steamers would be 395 feet long, and when full laden would draw something less than 16.5 feet, as against the 22-foot draft of an ordinary craft of identical displacement. The purpose of this reduced draft is to lessen the chance of a torpedo—set to run at a normal depth of 14 feet—hitting its target and, likewise, reducing the probability of the freighter stumbling upon submarine mines planted at a predetermined depth.

If the torpedo be adjusted to run nearer the surface—say at a depth of 5 feet—its explosive violence would be greatly sapped by the shallower stratum of water lying above the weapon. In other words, the tamping effect of the superposed water would be cut down nearly two-thirds, and

the destructive gases would find a correspondingly easier path of dissipation upward instead of horizontally and inward upon the body of the ship. Engineer Pugliese counts upon the character of the bulk cargo to absorb the shock and to lower rapidly the temperature of the rending gases, and then by suitable vents through the two decks above, to open further channels



PLANE VIEW OF THE DOUBLE-HULLED SHIP.

1, 1, 1. Compartments for the primary stowage of bulk cargo. 2, 2, 2. Secondary freight hold. 6, 6. Boiler rooms. 7. Engine room. 8, 8. Magazines. 9. Inner longitudinal bulkhead. 10. Middle or principal defensive longitudinal bulkhead. 11. Outer longitudinal bulkhead. 12. Athwartship bulkheads.

of escape. It will be noticed that there is no double bottom under the outboard cargo compartments at the points where mines would be most likely to hit. The freight stowed there would, if displaced by the blast, be more freely lifted than disturbed laterally, and, upon this assumption, the superheated gases would find their line of least resistance upward and through the large deck vents, which, in fact, are designed to serve as loading hatches. It will also be observed that the outboard stowage of freight is carried up to the main deck, and this disposition of the bulk cargo provides a potentially effective bulwark against shell attack from the guns of a submarine operating upon the surface. Likewise, the complete athwartships stowage of cargo forward and abaft of the vital area furnishes what is calculated to be a shield against a raking fore-and-aft fire.

Should, however, either the torpedo or the mine have force enough to spread its destructive work horizontally and athwartships, then the gases will meet a triple defence in the form of three parallel bulkheads, together providing two air spaces having a total width of substantially 53 inches. Inside this barrier are placed the vitals in the shape of boilers, engines, and stores.—*Scientific American*, 23/2.

MISCELLANEOUS NOTES

MAGNETS FOR RAISING SUNKEN SHIPS.—A submarine magnet invented by a Japanese scientist named Nakahara promises, it is stated, to be instrumental in locating many of the sunken submarines, warships, and transports which have gone down in comparatively shallow water. Tests of the magnet over the Japanese naval target grounds recently brought to the surface thousands of projectiles fired in practice. At the present price of scrap iron,

the 60,000 shells which lie scattered at the bottom of the Japanese bays will be worth a small fortune. It is suggested that the magnet should be used in extracting the shell scraps from the soil of the European battlefields. A development of the Nakahara magnet promises to be powerful enough to actually lift sunken vessels from the bottom of the sea. Magnets are now in use on land that will lift upwards of 40,000 pounds.—*Pages Weekly*, 22/2.

NEW SYSTEM OF RAISING VESSELS.—A new system of raising sunken vessels was demonstrated last week, when the 60-ton two-masted barge *Regla* was brought to the surface at Regla, across the harbor from Havana. Four tanks divided into two sections, one section containing acid and the other water, were attached to the hulk by divers. When all was ready a valve in each of the tanks was opened by means of lines, allowing the water in one section to mix with the acid in the other. The gases thus formed expelled the water, converting the tanks into buoys, the lifting power of which was sufficient to bring the craft to the surface and maintain it there. Although only a few feet of one of the masts was visible above the water, the moment the valves were opened the barge began to rise, and within a minute it was floating erect. Officers of the army and navy witnessed the demonstration.—*Nautical Gazette*, 20/12.

THIS LIFE-BOAT CAN BE SAFELY LAUNCHED BECAUSE OF THE CRADLE ARRANGEMENT.

CONSERVING THE LIFE-BOAT.—The launching of life-boats has always presented a serious problem. There are too many instances of life-boats being dashed to pieces against the side of the sinking vessel to elaborate on this

particular danger, but suffice it to say here that of all the difficulties encountered, perhaps this one is the gravest and by no means the least common.

No one should be better informed in this respect than the president of a navigation company. So it is quite fitting that Mr. J. L. Hyland, president of a steamship line and a resident of Winnipeg, Canada, should have invented a safety device for use in launching life-boats. Mr. Hyland's device, it will be noted in the accompanying illustration, consists merely of a cradle-like arrangement of steel rods and rollers attached to the bottom and side of a life-boat. As the small craft is lowered, the cradle keeps it clear of the ship's side and prevents it from being broken or upset on the rails, guards or uprights. It is said of this device that it assures absolute stability with the vessel at any angle and under any weather conditions. Obviously, when the life-boat reaches the water the cradle can be released by an arrangement of chains and connecting rods.

During a recent demonstration certain U. S. Government officials were present. To all appearances the device serves its purpose well.—*Scientific American*, 9/3.

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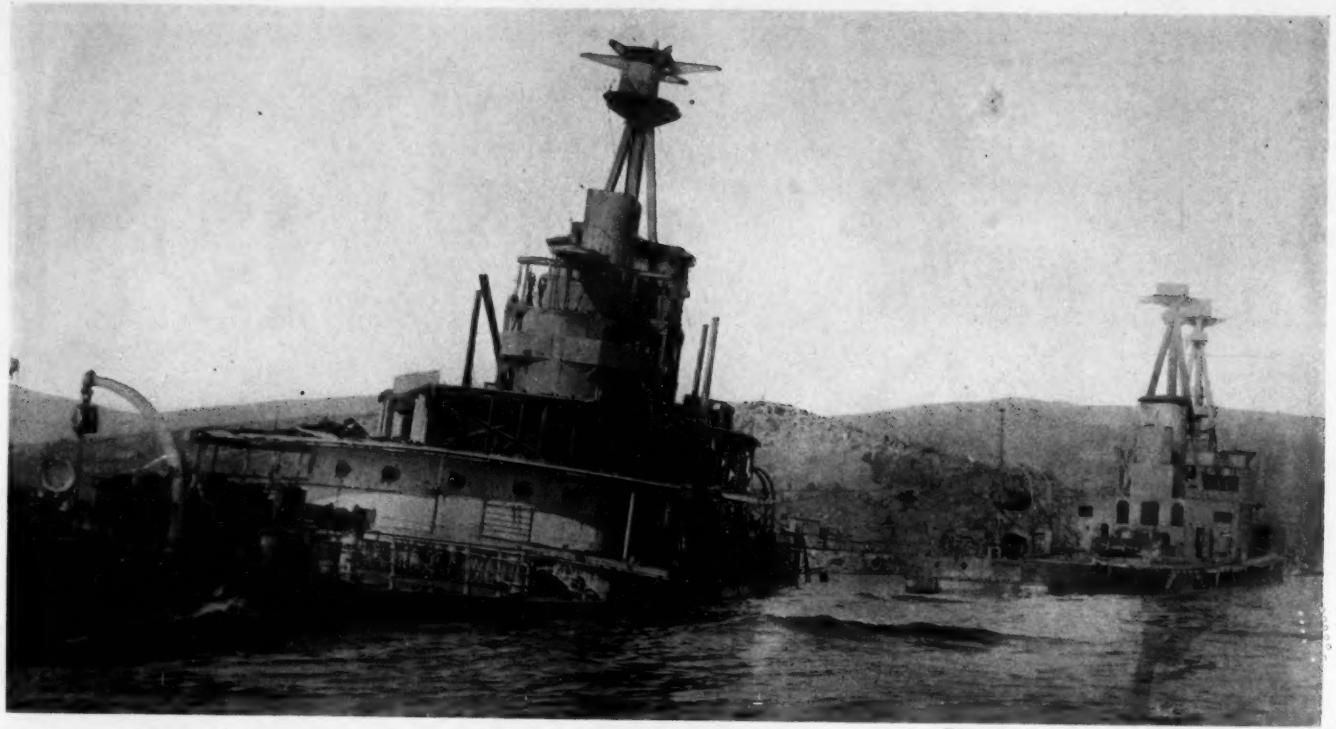

Photo by Central News Photo Service, N. Y.

BRITISH DUMMY DREADNAUGHTS FOOL THE HUNS.

For seven months a fleet of wooden dreadnaughts fooled the German Admiralty. While the real dreadnaughts were being used as convoys these ships lay at anchor to decoy the German ships from their haven. At last they were successful and the German vessels were lured to Kephalo where British destroyers lay in wait to open fire. In the fight which followed, the German flotilla suffered severely. One of the wooden ships was hit and beached to form a breakwater. Photo shows the one ship partly submerged and the other afloat.

INTERNATIONAL NOTES

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NAVAL WAR NOTES

PREPARED BY

Lieutenant W. B. Jupp, U. S. Navy

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STRATEGY

Dummy Ships.—The accompanying illustration shows two of the English fleet of 14 dummy ships which were used to great adavantage during the first two years of the war. Old merchant hulls were used for these ships and their upper works rebuilt with wood and canvass to represent various units of the British grand fleet. These ships caused considerable annoyance to the Germans in the North Sea and were in part responsible for drawing the Germans into the Dogger Banks engagement, the Germans believing them to be the patrol they were attempting to evade. Later in the Mediterranean a German submarine passed over a convoy of transports to sink one of these ships representing one of England's new dreadnoughts. The turrets of this ship floated for days in the vicinity showing Germany her mistake.—(Rewritten from *N. Y. Herald.*)

Convoy System a Great Success.—Speaking in the House of Commons recently, Sir Eric Geddes, First Lord of the Admiralty, stated that the convoy system has been greatly developed, and is a real success. Since it was adopted 35,000 ships have been convoyed with very low losses. Additional protection is afforded by the fact that the ships in convoys closely follow the Admiralty instructions.

"On many occasions the enemy has been assisted by negligence. Unless the ship is completely darkened in accordance with the Admiralty orders, night is no help against the submarine. In fact, the slightest visible light is an excellent target. We know this not only from unfortunate sinkings, but from the reports of our own submarine commanders and coast watchers who have observed unconvoyed ships. I appeal to the shipowners and shipmasters to heed three points: First, obey instructions; second, keep a good lookout; third, thoroughly darken the ship.

suffered severely. One of the wooden ships was hit and beached to form a breakwater. Photo shows the one ship partly submerged and the other afloat.

"One result of the convoy system has been to drive the enemy closer to the shore, thus rendering the open sea safer for navigation. During the first months of the unrestricted submarine war 50 per cent of the losses occurred more than 50 miles from land, and only 21 per cent within 10 miles of the shore. To-day the losses outside the 50-mile line have fallen to 1 per cent, while the losses close to land have risen to 61 per cent.

"This transfer of attacks nearer the coast gives increasing opportunities for attacking the enemy by patrolling surface craft and airplanes, and enables us to save many vessels which would otherwise have been lost. The improved salvage arrangements have made tremendous demands on labor and material. Repairs are to-day occupying more men than new mercantile construction.

"The salving is so efficient that of all British armed ships damaged last year only eight were abandoned."—*Nautical Gazette*, 14/3.

DESCRIBES FAKE U-BOAT.—Fake submarines would seem to be the latest Hun trick, according to an account contained in a letter from Carl B. Stancill, son of Rev. R. W. Stancill.

"We had two submarine scares," says the writer. "Sighted one, but our gunners soon put it to rout before it had a chance to shoot at us.

"A few days later we sighted what we took to be the periscope of a submarine and opened fire on it, but saw it was not a submarine, but a fake periscope with a mine on the bottom of it. But we steered clear, and after we were at a safe distance one of our torpedo-boat destroyers destroyed it."—*Washington Evening Star*, 16/3.

FEARS WILSON'S PLANS MAY YET WIN RUSSIA; GERMAN PAPER WARNS OF DANGER IN THE EAST.—Discussing President Wilson's message to the Russian Soviets, the Berlin *Vossische Zeitung* says:

"The promises that Wilson has made to the Russian people are no guarantee that they will be kept but are an indication that Wilson is in agreement with England and is pursuing a consistent Russian policy.

"We would remind our readers that through former Ambassador Gerard and by various other means Wilson has influenced Germany not to make annexations in the east."

The paper says he has kept to his purpose in order to bring Russia again under Anglo-Saxon influence. It goes on:

"To-day when Germany through her buffer-state policy in the east has endangered Russian sympathy, Wilson sees the moment for the fulfillment of the second half of his program. He adopts an attitude fundamentally opposed to the German eastern policy and is likely to succeed by diplomacy in removing German influence from the border states. At any rate, he intervenes as a supporter of a reunion of all the old Russian territory."

The *Zeitung* remarks that in connection with this it must be remembered that the echoes in which the Anglo-American conception is audible are ever increasing, and the idea is that the eastern peace is not an accomplished fact but must be properly regulated at the general peace conference. The paper admits that it is evident that Russia under the inuflence of promises such as above will welcome any revision of the Brest-Litovsk peace and may even demand it. It goes on to say that this idea may be realized and that Germany may find that her gains are turned as a weapon against her and that England and America will restore the freedom of these states. It adds:

"Even more is it to be feared that this advantage for which the Entente is willing to sacrifice its whole political position in the world will be wholly or in great part gained, and without a world equivalent.

"It is not yet too late to point to this approaching danger that we have seen coming for a long time. A definite settlement of the border states

to be separated from Russia has not yet been reached, and there still remains the possibility, when the decision is made, to allow freely, and even to advocate, a federation of these states with Russia.

"We are convinced now, as before, that a real majority of their people desire this federation and that from our own political viewpoint it is now a question whether they are to receive freedom from our hands or from Wilson's."

The *Vossische Zeitung* has disapproved the eastern policy of Germany from the beginning.—*N. Y. Times*, 17/3.

TONNAGE LOW WATER MARK PAST.—Last week Washington gave out the inspired statement that the overseas ship tonnage available for the Allies and ourselves had passed the low-water mark. Barring unforeseen occurrences, the upward trend should continue from now on. Among the important factors expected to contribute to this improved outlook are the withdrawal of ships from neutral trades, the speeding up of the release of ships through better unloading facilities in France, and the impressment of coastwise steamers into the transatlantic service. Thus, while the ocean transport situation shows signs of betterment, the relief is expected to come from a reallocation of existing shipping rather than from an increase in the amount of tonnage available. The U-boats are still actively at work and taking a considerable if diminishing toll of shipping. Some time, too, must elapse before the vessels now under construction can be expected to exceed in number those being sunk from month to month. At the moment, the work of the Inter-Allied Shipping Control Committee, in conjunction with the new import and export restrictions, is causing war freight to be moved across the Atlantic more freely than before. Indeed, it is stated that there is just now a plethora of ships at certain ports, and that the inability of our railroads to move freight promptly and as required, of which Food Controller Hoover has been complaining, is compelling vessels to lie idle waiting for their cargoes to arrive at the seaboard.—*Nautical Gazette*, 28/2.

THE SHIP SHORTAGE.—Authoritative statistics place the ship shortage at present at 7,435,894 tons. This is equal to nearly 1500 vessels of 5000 tons each, a tremendous handicap to overcome with the U-boats still keeping up their almost daily sinkings. This estimate is based on the amount of tonnage at the outbreak of the war, which was 42,574,537 gross tons, excluding German and Austrian vessels. Tonnage produced since 1914 and interned shipping seized, less nearly 12,000,000 tons destroyed, leaves the present world's tonnage at about 38,000,000 tons.—*Marine Journal*, 9/3.

BIG PLANS CENTER ABOUT BLACK SEA.—True to their character of conscious or unconscious German agents, the Bolsheviki have concentrated the entire Black Sea fleet (if our information is correct) ready for delivery to the enemy. There is no doubt that it will be secured by the latter, and will constitute a new danger to the Allies. When to the Black Sea fleet have been added certain Turkish elements, now assembled in the Sea of Marmora, the whole naval force will be in a position to sally through the Dardanelles and embarrass the British operations in Palestine.

With the aid of the Jewish inhabitants of Odessa, who number about 50 per cent, Germany hopes to erect Odessa into an independent republic and a free port. She will then use the port for shipping Ukrainian produce and raw materials as well as for her own goods destined for Persia through Batoum and Trezibond.

In the vicinity of Odessa are large Gehban settlements which have existed for 300 years. They number nearly a quarter of a million. Their influence is great. They publish their own newspaper, the *Odessaer Zeitung*, possess half a dozen clubs and two discreetly conducted branches of the German Navy League.

The Odessa Jews are proverbially pro-German. They are anxious that this flourishing center should be excluded from the Ukraine, whose treatment of them has been particularly rigorous. Indeed, the massacres which have occurred have all had their theatre within the new Ukrainian State.

In the harbor at Odessa is now a collection of British, French, Italian, and Roumanian steamships, which have been stationary since Russia declared war on Turkey. Their approximate total tonnage is 100,000 tons, amply sufficient to maintain German trade on the Black Sea. This is the more necessary as Turkey needs great supplies of foodstuffs from the Ukraine.

For the operations in the Black Sea the Germans have hitherto kept eight submarines at Constantinople. These will now be available for the Mediterranean.

Again, at Nicolaeff, near Odessa, are large shipbuilding yards, capable of turning out dreadnoughts. The Germans will build submarines, for which coal and iron exist in the neighborhood.

As to German plans in other parts, it is plain that it envisages the restoration of the monarchy in Great Russia after the Bolshevik have completed their disintegration.

Their loot already is enormous in war stores, machinery, foodstuffs and goods of all sorts. It may be estimated at £400,000,000 ($2,000,000,000). No wonder the western offensive is off for the moment.—*N. Y. Times*, 17/3.

SUBMARINE SINKINGS (GERMAN UNOFFICIAL REPORT).—There was recently a report from Berne that 23 submarines due home in German ports in the month of December failed to give any account of themselves. But from official sources we have heard nothing which justifies our accepting such pleasant news as reliable. It has not yet been claimed by us that we are sinking submarines faster than the enemy can build them. If so wide and determined an offensive is in preparation, are we equipped to meet it?—*Land and Water.*

TO CRUSH U-BOAT EVIL.—American naval officials appear to be satisfied that the weapons with which they expect to crush finally the submarine menace are forthcoming. Increased numbers of patrol vessels of various types, appliances and devices to make them more effective against underwater craft and the increased skill of navy personnel are among the things upon which they count. It has taken time to devise and build the weapons, but they are beginning to become available now.

This country's real contribution to the naval warfare is about to be felt. With every passing week the strength of the force will grow, for it is embodied in the most extensive construction program ever undertaken for the navy of any power.

The new destroyers and other craft must be added to the patrol fleets gradually as they are completed. Therefore no sudden falling off of tonnage losses is to be expected. It has been stated publicly by high British naval authorities, however, that next August will show beyond question that the U-boats have been overcome. There are officials here who are hopeful that decided results will be apparent before that, perhaps as early as May or June.—*Washington Evening Star*, 8/3.

NAVIES OF ALLIES SINK U-BOATS AS RAPIDLY AS BUILT.—It is now believed in official circles that the climax of the U-boat campaign against shipping is about past. Statistics as to the exact number of submarines sunk last year are withheld, but it is known that during the last six months the number destroyed each month has steadily increased. Officials familiar with the resources and facilities of Germany now are convinced that her output of submarines falls short of the number destroyed. Sir Eric Geddes, First Lord of the British Admiralty, said in the House of Commons that the rate of exaggeration in the German reports of tonnage alleged to have been sunk was increasing steadily. The exaggeration in the second quarter

of the period of unrestricted submarine warfare was twice that of the first quarter. The rates in the third and fourth quarters were three and four times that of the first quarter, and in January four and one-half times the first quarter. In the waters around the British Isles, which had been the enemy's chief field for submarine operations, great success against the U-boats has been achieved recently with the help of American naval forces, said Sir Eric. On the other hand, conditions in the Mediterranean have been more difficult to combat. Losses there accounted for about 30 per cent of merchant ships sunk. The resources for combating the submarine in those waters are less adequate and the successes obtained less satisfactory. It has become increasingly evident, the First Lord went on, that as the resources for combating the submarines improve it will be possible to turn attention more to the Mediterranean. The loss of the world's tonnage for the five months ending with February was 10 per cent less than the loss during the corresponding months of the previous year, he said, although during four months of the latter period unrestricted submarine warfare had not been proclaimed by the enemy. "I have stated," the First Lord continued, "that the curve of losses of merchant shipping continues downward. That statement is as true to-day as when previously made. It is true there have been bad weeks and bad months. February was, in comparison with recent standards, a bad month. But, on the other hand, January was a good one." He said he was seriously concerned at the *increasing number of vessels lost at night.* It appeared the enemy was assisted in this matter by *negligence on the part of shipmasters,* who displayed lights instead of darkening their vessels.—*Shipping,* 9/3.

GERMANY USING U-BOATS TO PREVENT AMERICA FROM FEEDING THE NEUTRALS OF EUROPE, ASSERTS WAR TRADE BOARD.—The War Trade Board authorizes the following:

Germany's war leaders are using the submarine war weapon to prevent fulfillment of American agreements to feed and relieve European neutrals. A mass of cumulative evidence and indications in the possession of the War Trade Board show that Germany is employing the submarine menace to prevent neighbor neutrals receiving any food or favors at the hands of the United States and its associates in the war and to coerce these neutrals through starvation into political and economic dependence upon Germany quite as much as to strike at the communications of its opponents—Germany's ostensible aim in proclaiming the ruthless submarine campaign.

Wishes to Weaken Postwar Rivalry.—Further indications tend to show that the submarines are being used, along similar dog-in-the-manger lines, to destroy neutral shipping without regard to its employment in order to weaken prospective neutral competitors after the war and to drag down neutral tonnage as far as possible toward a position of equality (or inferiority) with the German mercantile marine, which has lost between 40 and 50 per cent of its ocean tonnage, so that the neutral trader may be equally as badly off as his German rival for tonnage in the after-the-war race for commerce.

No other interpretation can be placed, for example, upon the repeated instances of destruction of neutral Danish ships on voyages between Iceland and the Danish mother country, entirely outside of the war zone, nor upon the multitudinous "mistakes," whereby Dutch and other neutral ships, clinging to the precarious narrow way left open through the prohibited zone are torpedoed outside the zone by U-boat commanders, whose word that the vessels were within the zone is later accepted unquestioned by the German prize courts.

Prominent shipowners in Scandinavian countries have stated their belief that many sinkings were inspired only by the intention to get rid of neutral tonnage so as to increase the relative value of German shipping available at the end of the war. Examinations of the captains of torpedoed ships

before the marine courts in these countries bear out this belief, the testimony repeatedly showing that vessels were attacked far outside the zone.

The intent of the Germans to prevent neutrals receiving food and supplies under relief agreements concluded with the United States is illustrated by the German veto placed upon the temporary *modus vivendi* with Holland, providing for the provisioning of that country. Two food ships loaded with supplies for the Netherlands along with 11 Belgian relief ships have been waiting in American ports for weeks unable to sail because of the refusal of Germany to permit an equivalent amount of tonnage leaving Dutch harbors, the obvious plan of the German authorities being to gather all Dutch ships into home harbors and then prevent any of them sailing by threats to torpedo any vessel leaving Holland waters. To relieve the food situation in Holland the War Trade Board has finally authorized the transshipment of the food in question from the two Dutch steamers to the Holland liner *Nieue Amsterdam*, which is sailing shortly.

Seek to Frighten Neutrals.—The present campaign of threats and intimidation against the Scandinavian neutrals now carried on in the semiofficial *North German Gazette* and other organs of the German press is obviously intended to frighten the northern neutrals from completing agreements which benefit the neutrals quite as much as the United States and its associates.

Now success of the earnest efforts of the United States Government to rush shipments of bread grain to Switzerland is threatened by the action of German submarines, which, according to now fully confirmed reports from Switzerland, have made a start on a new policy of ruthlessness by sinking the neutral Spanish steamer *Sardinero*, secured with great difficulty to carry food to that country. The torpedoing of the *Sardinero*, carrying nearly 4000 tons of cereals for Switzerland, can by no stretch of the imagination be brought within the scope of Germany's proclaimed submarine policy, since the vessel was engaged not in an enemy but in a supposedly safe trade for a neutral state, was en route to a port to which Germany had explicitly promised to leave open a safe passage and was torpedoed outside the prohibited zone.

U-boat Captain Examined Papers.—To add to the deliberateness of the offence, the *Sardinero* was destroyed after the submarine commander had made a thorough examination of the ship's papers and convinced himself of the nature and destination of the cargo, so that no plea of a "mistake" can be entered by Germany. The evident intent and result of the act was to prevent Switzerland, whose urgent and immediate need of food is well known to Germany, from receiving the American grain; to destroy a Spanish ship for after-the-war trade and to raise by this much the relative value and importance of each German ship afloat at the end of the war.

By the Swiss-American agreement of December 5, the Allies guaranteed to Switzerland for its admittedly urgent needs an eight-months' supply of 240,000 tons of cereals, subject to the assumption that Germany would safeconduct the supply ships as specified in its proclamation on ruthless submarining, which provided a safe route to the Mediterranean port of Cette, and promised that submarines would not molest such vessels.

Grain First Allocated to Allies.—To accelerate delivery and provide for immediate necessities before grain from the Argentine, the natural source of supply, could reach Switzerland, the War Trade Board even procured from the scanty supplies in this country 30,000 tons of grain which had been earmarked for the Allies and allocated it to Switzerland, arranging to replace it later by grain from the Argentine, and had further proved its good faith and desire to help out dependent neutrals by successful efforts to secure tonnage to transport the grain. The plans even contemplated bringing the ships back in ballast from Cette to accelerate shipments and remove any pretext for German submarine interference with the ships either going or coming.

It is hoped that Switzerland and other neutrals will contrast the respective attitudes of Germany and the United States toward the problem of feeding the neutrals and will take due notice of this latest attempt of Germany to intimidate neutral shipowners, through ruthless submarining, from carrying food to Switzerland. They will also note the same German spirit toward Holland, which Germany seems determined to prevent receiving food supplies except upon German terms.—*Official Bulletin*, 15/3.

THE UTILITY OF THE MINE IN NAVAL WARFARE has been demonstrated in many ways and at many times, and the improper use made of this machine by Germany will not necessarily remove it from the category of lawful instruments of war. Provided the regulations prescribed by international agreement are observed the mine should continue to play a useful and effective part in any struggle at sea, but its indiscriminate use in the German manner should be forbidden under heavy penalties. Such penalties, it is true, can only in wartime take the shape of reprisals, but it is becoming more and more evident that if this country had taken a stronger line in this direction earlier we should have been saved from much which has made the war as fought by the Germans a disgrace to civilization. The difficulty about the mine is, of course, that it breaks adrift, and as often as not without the mechanism which should make it innocuous having effected its purpose. It has been said that two years after the Russo-Japanese War came to an end ships were sunk by mines which had been laid during its progress. It may be expected that after this war the seas will remain dangerous for even a more lengthy period. While it should be a comparatively easy matter to sweep up the mines which have been laid in known and limited fields, the German submarines have dropped their machines in such a casual manner and without any precautions against their remaining a menace that no one will know where to look for them. The use of the submarine mine-layer has increased immeasurably the peril to come.

Yet, looking at the record of British naval losses in the past year, it is somewhat remarkable to find how small has been the proportion of vessels known to have met their fate by the submarine mine. This is greatly to the credit of the auxiliaries of the navy and their gallant crews engaged in ridding the seas of these dangers. Of the larger ships of the British fleet lost in 1917, the *Cornwallis* was torpedoed in January by a submarine, and the *Vanguard* was destroyed by an internal explosion. The *Drake* and the *Ariadne*, of the larger class of cruisers, were also torpedoed. The fact that while nine battleships were destroyed in 1915, eight in the previous year, and seven during the five months of the war in 1914, as against only four last year, indicates the comparative failure of the attrition tactics of the Germans so far as concerns the principal strength of the British fleet. The losses of the *King Edward VII*, *Russell* and *Hampshire*, all sunk by the agency of mines, were not repeated in 1917.

The lighter units of the navy are peculiarly exposed to the danger of the mine, owing to their being employed continuously in patrol and convoy work. It is not surprising, therefore, that of the casualties in this category of ships a larger proportion must be attributed to this agency. The published list of losses included 22 destroyers, of which about one-half were destroyed by mines. Similarly with the armed merchant cruisers and auxiliary vessels, such as mine-sweepers and guard boats, the proportion accounted for by mines is large. But, taking this into account, the toll of these types of vessels was small relatively to the large number which are at work at all times, either round these shores or in the Mediterranean.—*Army and Navy Gazette*, 2/2.

BARGES TO FOIL U-BOATS.—If actual trials prove the scheme to be practicable, it is understood that in order to check the depredations of the enemy's U-boats, immense oceangoing barges towed by powerfully armed tugs, may be used instead of steamships for transporting freight through

the submarine zones. Long, low-sitting, inclosed craft of steel construction will be tested. Crews being unnecessary, the barges are to be decked a few inches above the water-line so that from a distance they will be practically invisible to a periscope. As is perhaps generally known, a tug, because of its small size and comparatively shallow draft, offers a torpedo a poor target. In a gun duel, should a U-boat risk a fight, the tug would have nearly an even break with the enemy.—*Popular Mechanics Magazine.*

WAR IN THE AIR.—If it will be interesting to see if the Hun airmen who made such determined efforts to bomb London by night will attempt later on to emulate the methods employed by British pilots in their more recent raid on German centers of munition-making and railways. Our airmen descend to quite low altitudes and attack the anti-aircraft batteries in addition to dropping bombs; using their machine-guns freely by day and night against the gunners and the crews of the searchlights at night and firing into munition factories and trains in railway stations. These tactics have been repeated on several occasions, notably on January 21 and 22 in the Diedenhofen (Thionville) region, where some very heavy bombs were dropped on the steel works and railway sidings. The effect on the men who work the guns and searchlights appears to have been excellent, if one may judge from the comparative immunity enjoyed by our airmen on these occasions, while two tons of bombs were dropped on various objectives.

The use of machine-gun fire at low altitudes against troops on the ground is becoming a more prominent feature of flying tactics with each succeeding month, as one sees in the statements of service for which awards of honors are given. One instance, is that of Second Lieutenant George A. Wells, R. F. C., who was awarded the Military Cross for conspicuous gallantry and devotion to duty in engaging enemy infantry with machine-gun fire from low altitudes and attacking enemy aircraft. On one occasion, while attacking enemy strong points, his machine was so badly shot about that he was forced to return to his aerodrome. He resumed his patrol, however, as soon as he had obtained another machine, and on the following day he attacked a series of strong points with machine-gun fire, flying at a very low altitude for 40 minutes under intense machine-gun fire and field-gun barrage. He was eventually wounded in three places in the arm, but in spite of this returned to his aerodrome and landed his machine safely.

The use of fire by airmen against the enemy infantry in the trenches, as one of the means of co-operation with our own infantry, has become one of the outstanding features of aerial warfare, and is likely to be constantly employed during the present year both by ourselves and the Germans, more especially since so far "the man behind the gun" in the air has distinctly had the advantage over the man on the ground in most of the fighting of this kind which has taken place on the Western front.

Similarly, the attacks on enemy aerodromes and billets by the dropping of bombs, supplemented by fire delivered from low-flying aeroplanes into the hangars, has become more frequent and persistent. The *communiqués* record hundreds of bombs dropped on aerodromes near Courtrai on one night, and twice again at intervals of two and three days the systematic "strafing" by machine-gun fire of the enemy billets about Roulers and so forth, showing a persistent and effective harassment of the enemy which cannot fail to lower the vitality and the *morale* of the troops affected by it.

The enemy, on the other hand, has by no means been idle. He has carried out bombing raids on a large scale over the British line on the Western front. Three-seater aeroplanes have been sent out, a score at the time, by night at half-hour intervals, east of Bapaume, for instance, and every indication points to the probability that they, like ourselves, are rehearsing for more distant raids in the spring and summer both on France and England, and giving practice to the numerous *personnel* whom they have been adding to the strength of their air forces during the present winter.—*Army and Navy Gazette*, 9/2.

PREDICT AMERICAN SUPREMACY IN AIR.—Absolute supremacy in the air will be attained by the Allies within six months with the aid of the United States, according to estimates by War Department officials recently. Of course, they expect the necessary shipping to enable them to get the airplanes to Europe.

Authority has been given to commandeer spruce wherever it may be found in the Northwest, and already the largest sawmill in the world, near Vancouver Barracks, Wash., is working 24 hours a day cutting the finest timber for American airplanes.

One tree recently felled was 260 feet long, 15 feet in diameter, 20 feet from the ground and was 160 feet in length to the first limb. To facilitate hauling it 15 miles to the mill it was split where it lay.

American production of airplanes and engines is being speeded up, shipping is being prepared and the Allies expect to exert themselves to the limit in the next few months to hold their own in the air against the Germans.

The matter of getting the American airplanes to Europe is the crucial element in the aircraft program. No announcement has been made of the method to be used in transportation. Until recently it was understood that it was the intention of the Aircraft Production Board to ship the parts abroad and assemble them there, because of the saving in space on board vessels. It was said recently, however, that the board intended to ship a considerable portion of the airplanes already set up, so they could soon be put into service after arrival.

Pending the arrival of the American airplanes at the front, the United States has made arrangements with the Allies for the use of machines made there, and it is said here that production there is now sufficient to equip the American forces already in the field.—*N. Y. Herald*, 28/2.

A GERMAN OFFENSIVE.—Wherever two or three are gathered together, if other topics fail, a sure source of discussion will be found in the questions. "Will the German fleet come out?" and "How long before the war ends?" Without pretending to the gift of prophecy, it is permissible, perhaps, to suggest that if the first event comes off its date may easily approximate closely to that of the other. A German naval engineer lieutenant who deserted from Kiel in order to obtain a square meal in Holland—for thus he is described—is reported to have stated: "The German fleet is preparing for a general attack on the British grand fleet, but not before the autumn of 1918, when its leaders think they can take the risk." It would be interesting to know how the hungry engineer lieutenant came to know what was in the minds of the leaders of the German high sea fleet. According to many witnesses, the movements of the German naval forces are controlled from the military headquarters, and certainly it is more probable that the orders for the fleet to put to sea, when this is decided upon, will come from Berlin, and merely be repeated by the leaders of the fleet. We are not inclined to put much faith in the assertion of the engineer lieutenant. It was only the other day that Dr. Hertling, the German Chancellor, assured the Reichstag that the high sea fleet acted as a support and reserve to the submarines. It protected their bases and opened the way for them into the oceans to carry on their unrestricted warfare. Since there is no sign at present that the Germans intend to relax their efforts in the underwater blockade, it is only natural to assume that the high sea fleet will be risked in an action at sea. When that time comes it will be because neither the submarines nor the German harbors need the defence of a fleet, and it has become necessary to endeavor to obtain an ultimate decision by a naval battle.—*Army and Navy Gazette*, 2/2.

LESSONS OF THE WAR

EIGHT MONTHS OF U-BOAT WARFARE.—*Evasion Proves Best Defence Against Submarines.*—Aside from the moral question as to the barbarity of submarine attacks as a method of warfare, upon which the civilized world

is unanimous in condemnation, the submarine may be regarded from two points of view: First, as a means of warfare; and, second, as an instrument of warfare. It is particularly with the latter that the present article deals. It may be well, however, first to review the situation from the more general standpoint of the submarine as a means of warfare.

During the period from the week ending April 8 to the week ending December 9, 1917, the number of arrivals and departures of vessels from British ports was 188,012. In that period the number of vessels sunk by submarines was 826, or .44 per cent. In a recent speech, Secretary Daniels asserted that "one thousand ships have been added to allied tonnage since entry of the United States into the war." The question of tonnage is as important as the question of the number of vessels. The incomplete evi-

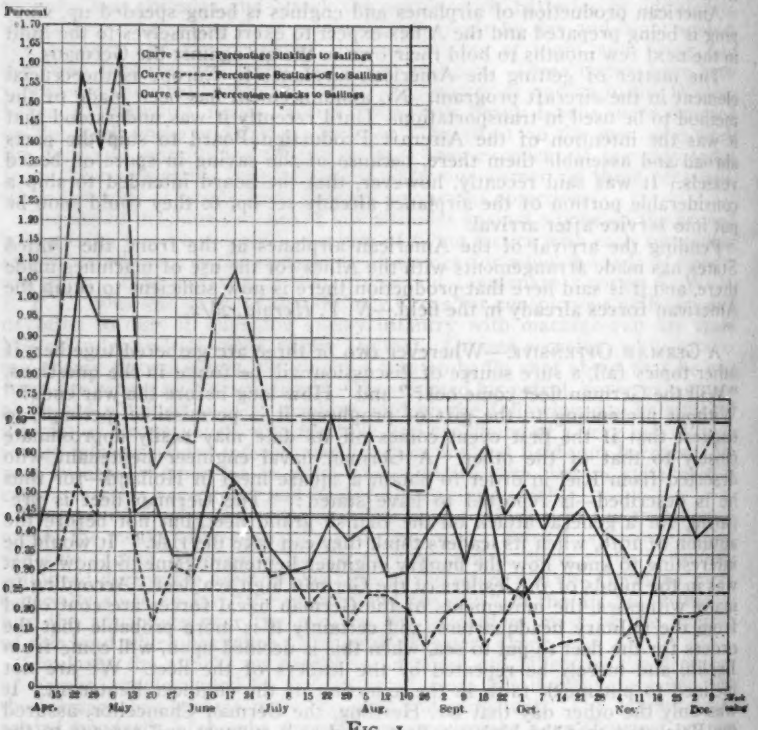


FIG. 1.

dence available indicates that the Allies have maintained the tonnage of their merchant fleets as well as the numbers. Undoubtedly, also, many enemy submarines have been captured or destroyed, so that even if Germany, at best, has been able to maintain the number of her U-boats, she is not accomplishing the destruction of allied shipping. The submarine as a means of warfare must be pronounced a failure, though a danger and a menace.

In considering the submarine as an instrument of warfare three points must be dealt with. First, the ratio of the number of ships attacked to the number of arrivals and departures (sailings) at British ports; second, the ratio of ships sunk to sailings; third, the ratio of the number of ships which beat off attacks to the number of sailings. A fourth point, of perhaps secondary interest, is the ratio of ships sunk, and of ships which beat off attacks, to the number of ships attacked. Fig. 1 deals with the first three

of these questions, Fig. 2 with the fourth. The amount of the tonnage attacked or destroyed is a secondary consideration from this point of view. The effectiveness of the submarine as an instrument is tested even more severely by a small ship than by a large one as far as finding the ship is concerned, and is tested in about the same degree by each in the sinking of the ship.

Discussion of Fig. 1.—1. Curve 1 (full line) shows graphically the percentage of "sinkings" to "sailings" for weekly periods from April 8 to December 9. The straight line 1 (44 per cent) shows the average percentage of sinkings to sailings for the same period. The curve falls decidedly below the average line in passing from left to right. The conclusion may be drawn that the success of the U-boat in destroying (in addition to finding or discovering) ships has decreased.

2. Curve 2 (dotted line) shows graphically the percentage of "beatings-off" to sailings for the same period. Straight line 2 (25 per cent) shows the average percentage of beatings-off to sailings. This curve also falls decidedly below the average line in passing from left to right, showing that

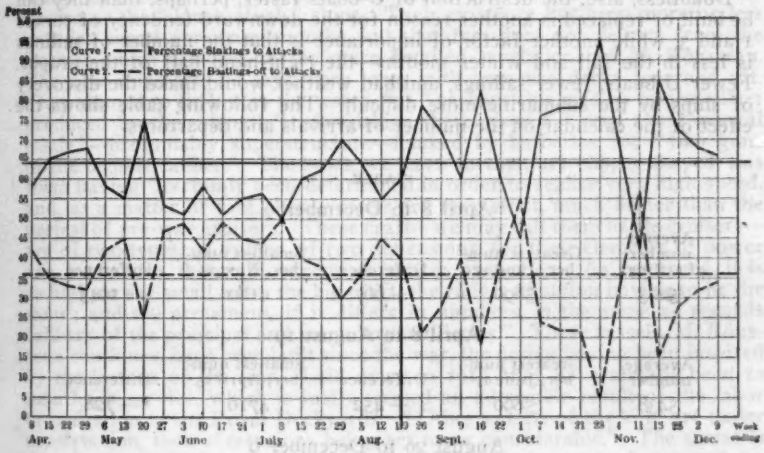


FIG. 2.

the success of ships in escaping from, in addition to evading, the U-boat has decreased.

3. Since both the success of the U-boat in sinking ships and the success of ships in beating off attacks have decreased some common factor must be looked for as the cause. This common factor is probably the unfavorable weather conditions of fall and winter, which make it easier for ships to evade the submarine, but also make it easier for U-boats to do their work and escape when the victim is once discovered. Increased strength of convoys would suggest itself as another factor, since the convoy, by preventing the submarine's attack, would reduce both the percentage of beatings-off and of sinkings. As will be pointed out, however (paragraphs 7 and 8 following), there are reasons to believe that weather conditions are a factor of primary importance.

4. Curves 1 and 2, on being compared, show two markedly distinct periods. In the first period (April 8 to August 19) the curves rise and fall simultaneously, which indicates that good weather conditions (spring and summer) are equally favorable to U-boat and ship. In the second period (August 19 to December 9) the maxima, or highest points, of one curve correspond to the minima of the other. A possible explanation of this fact will be mentioned in paragraph 9 under the discussion of Fig. 2.

5. Curve 3 (dash line) shows graphically the percentage of attacks, successful and unsuccessful, to sailings for the same periods. The heights of curve 3 are, of course, the sum of the heights of curves 1 and 2. Straight line 3 (69 per cent) shows the average percentage of attacks; in other words, the average percentage of discovery of ships. That is, the submarine finds, on the average, 69 out of every 10,000 ships that enter or leave port.[1] Curve 3 falls very decidedly below the average line in passing from left to right, which indicates that the success of the U-boat in attack (*i. e.*, in discovering ships) has decreased.

6. The principal cause of this decrease is, probably unfavorable weather conditions. (See paragraph 8.) On the other hand, the extreme height of curves 1 and 3 in the beginning is probably due to the sudden outburst of U-boat warfare after a long period of preparation. These extreme values make the average value of the percentages high and doubtless explain, in a measure, the failure of the U-boat to "come up to the average." The submarine is probably a more efficient instrument of war than curves 1 and 3 would indicate.

Doubtless, also, the destruction of U-boats faster, perhaps, than they can be built or replaced is another reason for the downward tendency of curves 1 and 3, while another factor of importance is that the number of sailings is less in the fall and winter months—the right-hand half of the graphs. Fewer U-boats, fewer sailings, and bad weather would make the discovery of ships by the submarine more difficult. The following table shows the effect of the calendar on the number of arrivals and departures.

TABLE

April 8 to December 9

Average number of sailings	Greatest number, June 17	Difference	Smallest number, Nov. 25	Difference
5223	5890	+667	4180	—1043

April 8 to August 19

Average number	Greatest number, June 17	Difference	Smallest number, April 15	Difference
5438	5890	+452	4710	—728

August 26 to December 9

Average number	Greatest number, Aug. 26	Difference	Smallest number, Nov. 25	Difference
4953	5709	+756	4180	—773

It must be borne in mind also that another possible factor in the decrease of the percentage of ships discovered and attacked is failure of the U-boat to obtain information as to sailings. Doubtless many sources of secret information have been discovered and suppressed.

Discussion of Fig. 2.—7. Curve 1, Fig. 2 (full line) shows graphically the percentage of sinking to attacks; straight line 1 (64 per cent) the average percentage of sinkings.

Curve 2 (dash line) shows the percentage of beatings-off to attacks; straight line 2 (36 per cent) the average percentage of beatings-off.

These two are, of course, complementary curves, where one rises the other sinks proportionally.

The rise of curve 1 and the fall of curve 2, with reference to the average lines in passage from left to right, show an increase in U-boat success in

[1] For the period April 8 to August 19 the number is 83 in 10,000; for the period August 26 to December 9, 52 in 10,000.

destroying (not in discovering) ships, and a decrease in the success of ships in beating off (not in evading) the U-boat.

8. It can hardly be assumed that the U-boat has become more skillful in attack while the ship has become, relatively, less skillful in defence. Probably the skill of both has increased. On the other hand, there is no reason to believe that more ships are sailing unarmed for defence; and there is reason to believe that more are being convoyed. The conclusion may be drawn, therefore, that bad weather conditions (fall and winter) are favorable to the submarine in sinking, though not in finding ships.

9. The rise of curve 1 would explain also the reversal of maxima and minima in curves 1 and 2 of Fig. 1 for the period August 19 to December 9. Given bad weather conditions, in any week that a U-boat finds ships, it is likely to succeed in sinking a large percentage of them before they can prepare to beat off the attack.

A CYCLE IN NAVAL ARCHITECTURE.[1]—With the sanction of the British Admiralty, M. Rousseau, naval critic of the Paris *Temps*, has given the world an account of those new additions to the navy which are popularly known as the "Hush Hush" ships. Their existence has been more or less an open secret for many months, but that fact does not detract from the interest which attaches to the more detailed revelations of M. Rousseau. The new ships are, he says, very long, with immense decks fore and aft. They seemed to lie low in the water, but "perhaps this was an optical effect produced by their length." Amidships there rises a "very squat central castle"—presumably superstructure—flanked by barbettes for "two guns of the biggest caliber." The bows, we learn further, are clipper shaped, this form having "certainly been determined in order to realize very high speed, and, as a matter of fact, these vessels are very swift, much fleeter than the fleetest of pre-war cruisers. These craft—we may call them battle cruisers—are of two types, or, rather, of two dimensions, for their elements of power are, we believe, the same, except as regards protection. As for speed, it is as high on the small as on the big craft, the radius of action having to be the same; and the armament, if it differs in numbers, is the same as regards calibers of the principal and secondary artilleries." These vessels, M. Rousseau continues, have been built since the war, the design having been inspired by the lessons of the war. Laid down in 1915, they have already been 12 months in service, which is justly termed an admirable result of the labor organization in the Royal Dockyards. "Other vessels of the kind are under construction, their dimensions being yet more considerable." The turret is described as containing enormous guns, which fire two rounds per minute, and which, according to the Germans, weigh 96 tons and throw a 1947-pound shell. M. Rousseau goes on to explain that the two vessels he inspected are sisters, designed to work in company, because they have the same fighting power. "They are capable of surprise actions, against which the enemy cannot guard himself, and their speed is a guarantee against the torpedo. None the less they are fitted with devices to neutralize the explosion as far as possible. They are a proof of the confidence of the British Navy in the powerful surface vessel, capable of heavy hitting, the only one which appears able to assure the mastery of the seas. "England," he concludes, "is building many submarines, but the development of this new weapon has not affected the theories which have made the naval power of our Allies, and this is proved by the new building programs, which are the outcome of experience."

There are some people who will probably be surprised to learn that we are still building capital ships, apparently of the largest dimensions, in spite of the submarine, but we ourselves welcome the revelation, and are not in the least astonished at it. In these columns we have consistently upheld the view that "the powerful surface vessel, capable of hard hitting"—in other words, the capital ship—still remains the supreme arbiter of naval warfare,

[1] *The Engineer.*

and that the time is not yet come for the capital ship to yield its place to the submarine. This judgment, we are aware, is in direct conflict with the views of several distinguished authorities, including Admiral Sir Percy Scott, who are inclined to pin their faith to the small and cheap submarine weapon, and have adopted, in a modified form, the well-known tenets of the French "Jeune Ecole." In a recent article we quoted the opinion of the late Admiral Dewey, who declined to concede that submarine development had seriously reduced the value of the heavy fighting ship. He did admit, however, that the menace of underwater attack had become serious enough to justify drastic modifications in the design of surface ships, a point on which there is general agreement. To continue building costly leviathans which, however, great their gun power and armor protection, were liable to be disabled or sunk by a single torpedo, would be manifestly unwise, and we are convinced that this important feature was duly considered when the new ships of which M. Rousseau speaks were in process of design. In fact, he specifically mentions the devices with which they are fitted to minimize the effect of submarine explosion. After a prolonged naval campaign, in which every weapon has been subjected to the final and exhaustive test of action, it follows that many improvements must have suggested themselves. No doubt the capital ship of to-day is designed on principles which differ fundamentally in some respects from pre-war practice. But it is clear from M. Rousseau's remarks that the naval authorities of this country have no intention of abandoning the construction of such ships. In the United States, where the lessons of the war have been most carefully studied, not only are heavy armored ships being built in larger numbers than ever, but the size has grown enormously, and battleships of 40,000 tons, and battle cruisers of 34,800 tons, are either building or projected. Nor has Germany lost faith in the powerful surface ship, for it was recently announced that a new battle cruiser, named the *Graf von Spee*, had been launched at Danzig. As long as the three leading naval powers, two of them having had 40 months' war experience, continue to build these vessels, we may take it for granted that the submarine has altogether failed to substantiate its claim to be regarded as the most potent instrument of combat.

Although it is not yet permissible to publish further details of the new British cruisers, M. Rousseau tells us enough to indicate not only the broad features of the design, but also the tactical function the vessels are meant to fulfill. No type of warship has in modern times been the subject of so much controversy as the battle cruiser. When the *Invicibles* were launched in 1907 they were severely criticized by many eminent officers. Far too much, it was urged, had been sacrificed to speed, the tactical value of which had yet to be demonstrated, and when from the comparatively modest figure of 17,250 tons for these ships the displacement rose in the *Lion* class to 26,350 tons, the advocates of moderate displacement were speechless with consternation. The increase in size, great as it was, had become essential in order to realize the ideal at which the Admiralty was aiming, viz., extremely high speed combined with the greatest possible artillery power. In all the battle cruisers designed in this country protection was to some extent sacrificed to obtain these two desiderata. Germany soon adopted the type, but developed it on somewhat different lines. She was content with slightly less speed and a lighter armament, but gave much more attention to armor protection. The war had not been long in progress before the battle cruiser proved its value. The engagement off the Falkland Islands—so far the most decisive action of the war—was rightly hailed as a triumph for the battle cruiser, though its success on that occasion was more strategical than tactical, for it was only by virtue of their high mobility that the *Invincible* and *Inflexible* were able to cross the ocean at the sustained sea speed of liners, and arrive at Port Stanley in the very nick of time. In the later action of the Dogger Bank, and also at Jutland, the battle cruiser was found to be more vulnerable than had been suspected, but the fact that

it risks disablement or destruction by engaging battleships for any length of time does not discredit the tactical theory which evolved this type. The new British cruisers of which M. Rousseau writes would appear to be the logical development of the *Invincible* archetype. They are, as he says, extremely fast, and their armament comprises a very limited number of exceptionally heavy guns. To find the true origin of the battle cruiser we must go back 45 years, and seek it not in England but in Italy. It was in 1872 that the keel of the *Duilio* was laid at Castellamare, a ship that represented precisely the same tactical idea that resulted in the *Invincible* of 1907, and the new cruisers now with the grand fleet. As originally planned the *Duilio* and her sister *Dandolo* were to have displaced 10,401 tons, but actually they were nearer 12,000 tons. They were 341 feet long between perpendiculars, 64¾ feet in beam, and had engines of 7700-7900 indicated horsepower for a speed of 15 knots. The hull was protected by a belt of 21-inch armor, which, however, was only 107 feet in length, thus leaving more than two-thirds of the side bare of vertical armor, but a flat deck composed of iron and steel plates ran from end to end of the ship at some distance below the water-line. The side above the main belt had 17¾-inch armor and formed a central citadel, surmounted by two turrets protected by 17¾-inch armor, and each containing a pair of 100-ton guns. These turrets were placed *en échelon*, with the centers at a distance of 7 feet 8 inches from the center line of the vessel, an arrangement that rendered it possible to train three guns parallel with the keel, while all four covered a limited arc on either beam. These were the salient characteristics of a design which attracted great interest in naval circles everywhere by reason of its novelty, and combined in a single ship immense gun power and high speed. The famous *Inflexible*, laid down in England two years later, was admittedly a modified copy of the *Duilio*, though in her case great speed was not a conspicuous feature. In Italy the integral idea was further developed in the *Italia*, an amazing specimen of naval architecture for those days. This vessel displaced over 15,500 tons—several thousand tons more than the largest warship then afloat—was 400 feet long, and was intended to steam at 18 knots, whereas scarcely any of the existing armored vessels were good for more than 14 knots. Like the *Duilio*, she carried four 100-ton guns in échelonned turrets, but she differed in having no vertical armor at all. The vitals were protected by a 3-inch steel deck, and amidships rose a redoubt of 19-inch steel, to defend the gun positions. In speed the *Italia* was quite unique among her contemporaries, and this fact, coupled with her ponderous battery, made her, in the opinion of many, by far the most formidable warship in the world. A sister ship, the *Lepanto*, launched in 1883, was followed in 1887 by the *Re Umberto*, another vessel of the same generic type, but with the displacement reduced to 13,250 tons, and the armament to four 13.5-inch breech-loaders. On the other hand, the speed was increased to 20 knots, and in place of the central redoubt a thin belt of armor was fitted. Moreover, the échelon system was discarded, and the turrets were placed on the center line, for at that date broadside fire was already recognized as of more importance than end-on fire, which alone had warranted the tactically vicious échelon arrangement.

For many years Italy alone continued to build vessels of the general type described above, for at that time other countries were absorbed in problems of armor, and apparently regarded speed, and even gun power, as secondary considerations; but it must always be placed to the credit of the Italian constructors that they were a generation in advance with their tactical theories. Between the latest British battle cruisers, as described by M. Rousseau, and the *Italia* there are no fundamental points of difference, though they are separated by nearly 40 years, and a most interesting cycle in naval design is thus completed.—*Scientific American*, 5/1.

VALUE OF MONITORS.—What would, however, be of great interest would be some definite information as to what this episode teaches us of the fighting value of monitors of the *Raglan* class. Of the value of the American 14-inch rifle there is, of course, no doubt at all, if we assume it to be rightly aimed and controlled. But the control of guns in a small monitor, which is not particularly seaworthy and which in many conditions of wind and weather cannot keep a course for more than a minute or two at a time, presents difficulties much greater than the same problem in battleships. With everything in the monitor's favor then, she would not be likely to make so many hits per gun per minute as a battleship would make with equal artillery in similar conditions. A broadside of 10 guns in a seagoing ship would be expected therefore to make more than five times as many hits in any given time as the guns in a monitor. If, as I have suggested, *Raglan* was unable to open fire at all, the events of January 20 would necessarily throw no light on her fighting capacity whatever. But it should throw some light on her capacity to stand punishment, and if these monitors were built to engage either battleships or seacoast forts, it is to be presumed that a certain capacity to stand punishment must have been contemplated. For in either event her opponent must have been expected to command the higher probability of more rapid hitting, so that unless the monitor could put up with a good many hits before being out of action, the chance of her damaging her enemy and hence being of any fighting value, must be slender indeed. All we are told is, that *Raglan* was "heavily" hit. That might mean half a broadside—or five broadsides. If one 11-inch shell sufficed to knock her out, then five would be very "heavy" hitting.

The question is interesting because, while we have often heard of monitors being employed against Zeebrugge and other positions on the Belgian coast, the sinking of no one of them has yet been reported, nor with the exception of a small monitor sunk by enemy submarine whilst co-operating with the army in Palestine have we ever learned of any one of the ships of this class even receiving a casualty in action. Have none ever been so exposed that they could be hit? Or being hit, have they received the blows of the enemy without damage to themselves? What was the difference between the conditions in which they had previously figured and those which were so disastrous for them? It is obvious that an examination of the data of the fight at Ibros should throw a very valuable light on the wisdom of the policy that gave these novel—but untried—craft to the British Navy, at a time when the dangers of the submarine campaign seemed to call for nothing but concentration upon the production of destroyers.—*Land and Water*, 31/1.

LORD JELLICOE'S SPEECH.—Lord Jellicoe made a speech of great importance at Hull recently when he gave his audience for the first time in the course of this war an estimate of at least one future date, to wit, the date when the rate of building, etc., should have mastered the submarine peril. He did not give the date as a definite one, still less of one of minimum time; he gave it as a maximum limit and fixed it for next August—roughly six months from the present date.

There is no one else who can speak with anything like the authority of Lord Jellicoe in the matter, and his judgment will be received everywhere with a respect that certainly does not attach to the wild speeches of politicians. Apropos of those speeches, Lord Jellicoe very wisely reminded his audience that almost every irresponsible piece of boasting was followed by a disaster and that this was particularly the case with the extraordinary belittling of the submarine peril in the recent past by the Prime Minister. All that, however, is of no practical importance. The important thing is that the man who can tell us most about it has warned us that there will be a continuation of the present strain for at least six months.

The nation can stand the strain if it is properly informed, in the old sense of the word "informed," that is, not fed with sensational tid-bits of news,

but educated in a right judgment of the situation. Of course, decisive events on the continent, whether within the enemy's territory or against his armies, would change the whole problem, but as things are we must bear in mind that term, next August, and not shrink from the length of the ordeal before us.—*Land and Water*, 14/1.

SHIP CAMOUFLAGE.—Many ship owners are slow to grasp the importance of camouflage on their ships leaving Atlantic ports bound for the war-zone. To show that the government appreciates its value, it has, through the Federal War-Risk Bureau, granted a reduction of one-half of 1 per cent in the rate on vessels using one of these approved systems, and also provided with smoke-boxes and sufficient anthracite coal for two days' steaming in the zone.

A trip around any one of the several large harbors along the coast will give ample opportunity to see the different types of camouflage. There are two types, two distinctive types—the low visibility and the dazzle system. The low visibility type aims to present the minimum of visibility of a vessel. The dazzle system of painting a ship is designed to make a vessel appear more conspicuous at short ranges in order that a false impression may be given of her true form and her exact dimensions. There is no attempt at the imitation of either the sea or the sky. In a sentence, the dazzle system is aimed to fool the U-boat commander on her perspective.

There have been scores of marine camouflage patterns submitted to the Shipping Board for consideration. Some are good and possess considerable merit; others are faulty and utterly impracticable. Three factors enter into a suitable camouflage design for a ship: First, the power of the design to present low visibility or dazzle effects. Second, the cost to put the design upon the vessel; paint is costly and $1000 should not be wasted. Third, the design submitted must, if proved practicable, present the minimum of difficulty in painting on the vessel. In other words, if the design is of the dazzle type it must aim to present the maximum of illusion with the minimum of difficulty in painting. The stern of the average vessel is a hard proposition when it comes to placing a camouflage pattern upon it.

There are, however, four men who have contributed excellent camouflage systems. They are not mere theories. Their patterns can be seen on vessels entering "an Atlantic port." These men are Messrs. Herzog, Mackay, Brush, and Toch.

The first two men aim at reducing low visibility. Messrs. Brush and Toch both say their systems baffle the range-finder while not reducing visibility too much. In brief, the Herzog system is painted on a vessel in diamond designs; the Mackay is composed of oblong dots, the Brush system is in black and white, while the Toch idea is embodied in S-shaped waves of four vibratory colors.

One example of camouflage proved clever enough to fool an expert at the art as well as a naval officer. The former was first to discover the deception. Says *The Commercial Appeal:*

Recently a United States naval officer and a camoufleur of repute were gazing absently from the top floor of a New York sky-scraper. Suddenly the officer called attention to an object moving slowly down the river. As their eyes became focused they decided it was a United States destroyer convoying a submarine. Then the camoufleur changed his opinion, but the naval officer remained obdurate. The background of the destroyer was the usual battleship gray; the camouflage was painted in jet black and consisted of the design of a full-sized submarine outlined in bold relief. The periscope was painted on the middle stack of the destroyer.

A certain allied cruiser in the Atlantic had adopted a disguise by painting the sides and funnels so as to make it appear as an entirely different craft. The effect aimed at is low visibility. From the bow a curve of gray is painted to a distance of about 25 feet; then the sides of the hull are painted black within 25 feet of the stern, when gray is again used. The

turrets have the gray badly broken by black vertical bands and the funnels are swept by waves of black bands upon the gray surface. The stern presentation is the same as that of the bow—all gray. Running away from another ship the cruiser would appear all gray, but when passing or being passed broadside all the color scheme vanishes, fades away, as it were, so that at night the vision is unable to discern the outlines of the cruiser.

Another method adopted by one of the allied governments for its battleships is to paint a heavy line on the bows to present the illusion that the vessel is traveling faster than she really is. This, simple though it appears, is held very highly by camoufleurs, because to register a perfect hit with a torpedo, it is first necessary to estimate exactly the distance, the speed of the vessel to be torpedoed, and the exact direction in which she is traveling.—*Literary Digest*, 16/2.

ATLANTIC

TWO SUBMARINE ENCOUNTERS (DECEMBER 21).—The first one was discovered attacking a sailing vessel and the patrol hurried to the scene of action about 10 miles distant. When they were within 500 yards of the ship the submarine had submerged.

We were soon amid the rushing of the turbulent water that is caused by a huge "sub" directly after submerging. We let go one of our mines from the stern quarter, set to explode at 80 feet.

As these mines are quite powerful, containing a large charge of TNT, we were soon rewarded by seeing the color of the water change in the immediate vicinity of the explosion, and while attending to the picking up of the fishermen it was noted that among the bubbles then appearing on the surface a brownish shine predominated.

Only delaying long enough to make sure that we had finished for "*la Boche*," we picked up the crew without further mishap, the entire incident occupying but 40 minutes from the time of hearing the first report until the consummation of the rescue.

The fates were exceedingly kind to us on this day, for at 11 o'clock that night, while the subject of the recent attack was still under discussion, the lookout on the bridge discovered another monster lying on the surface, for all the world like some huge whale taking the air. This submarine was about 500 yards dead ahead, and while quickly jamming the helm over, the officer of the deck ordered the starboard battery to take a shot. The shot may not have taken effect, as the "sub" was then in the act of submerging, but as we steamed directly over her wake and let go four mines of different sizes in as many seconds we were soon assured that we had done for another.—*Literary Digest*, 16/2.

U. S. NAVAL AIRMAN MISSING; HIS SEAPLANE SHOT DOWN.—A dispatch received by the Navy Department, states that a seaplane operating in European waters in which Ensign Albert Dallon Sturtevant, United States Naval Reserve Force, was on reconnoissance duty was shot down. As the ensign is still missing, it is feared that he was killed.—*Official Bulletin*, 19/2.

LOST U. S. SHIP SAFE.—Safe arrival at a European port of an American-built 110-foot submarine chaser with a French crew aboard, which had not been heard from since January 15, is announced by the Navy Department. The little craft was separated from her escort during a terrific gale while bound for Europe.

No navigating instruments were aboard, but, after being blown far off their course, the Frenchmen estimated their position and headed for port. To their remarkable seamanship is attributed the success of the voyage. With the engines disabled by the storm, the crew rigged up sails from bed coverings and sailed for 39 days.—*Washington Evening Star*, 27/2.

U. S. NAVY TUG "CHEROKEE" SUNK OFF THE ATLANTIC COAST; 10 KNOWN SAVED OF 40 ABOARD; FOUR DEAD PICKED UP BY STEAMERS.—*Survivors are Landed at Philadelphia; Two Men Washed Off of the Second Life Raft Launched.*—The Navy Department is advised that the U. S. S. *Cherokee*, a navy tug, foundered off the Atlantic coast. Of the 40 aboard—five officers and 35 enlisted men—10 had been landed at last accounts, these having been taken to Philadelphia. Four dead were picked up by steamships.

The 10 known survivors got away in the first life raft. Four got away on the second life raft, but two were washed overboard and the other two were dead when picked up by a British steamer.—*Official Bulletin*, 27/2.

NAVY TUG "MARINER" LOST DURING A HEAVY GALE.—The Navy Department is informed that the tug *Mariner* was lost in the heavy gale of February 26. All the officers and crew were rescued and taken to port.

The *Mariner* was a wooden tug, gross tonnage, 220; net, 110; length, 109 feet. She was formerly the *Jack T. Scully*, owned by the Neptune Line, and plied between New York, Boston, and Bangor, Me. She was taken over by the navy in September, 1917, and after repairs costing about $3000, was commissioned at the New York Navy Yard, December 19, 1917.—*Official Bulletin*, 2/3.

ARMED GUARD COMMENDED FOR ITS CONDUCT IN U-BOAT ATTACK.—Secretary Daniels has commended Thomas J. Beerman, chief gunner's mate, United States Navy, commander of the armed guard on the steamship *Borinquen*, for the discipline maintained and the cool and steady work of the gun crews when that vessel was attacked by a German submarine on the night of October 30, 1917.

In his report to the Navy Department, Chief Gunner's Mate Beerman states that he was in his quarters at work on the log when he heard a shout of warning from one of the men at the gun, the commander reaching his station just as the second shot was fired. It was 11.45 p. m. when the forward lookout reported a dark object off the port bow. The weather being misty and foggy, he could not make it out until it was 70 or 80 yards away; then he reported it to be a submarine.

Saw Second Shot Hit.—"The submarine was lying to when first sighted," the commander states. "We think she was receiving news from her headquarters. I did not see the first shots, but the petty officer said the first shot went over the top of the submarine's conning-tower. The second shot I saw hit, exploding and carrying away the conning-tower. She was about three points abaft the port beam. As the captain was putting the ship's stern to the submarine, the third shot was fired. I saw it hit and explode. Before the helmsman could get control of the ship, the submarine lay off the starboard quarter in the trough of the sea.

Went Down in Upright Position.—"After the second shot the submarine seemed to stop and lie in the trough of the sea at the mercy of the gun. The fourth shot fell 10 to 25 yards short. When last seen the submarine was going down on the swell with her bow sticking in the air and stern down. She was going down in an upright position."

The commander of the armed guard praises the captain for the excellent manner in which the ship was handled.—*Official Bulletin*, 18/3.

FOUGHT U-BOAT SIX HOURS.—*Steamer's Gunners Finally Landed a Shell and Foe Submerged.*—An officer of a steamer from an American port gives a stirring account of a 90-mile fight with a U-boat in the Atlantic. It lasted from the firing of a torpedo, which just missed, at 11.45 a. m., until 5.40 p. m. During that time the stokers worked without ceasing to get every ounce of steam out of the boilers. The engineers got her up from a normal 10 or 11 knots to more than 13½.

"The gunners were on duty every second," said the officer. "From the bridge we could see every shot from the submarine. We formed a big, high

target 500 feet long, and the enemy showed only a small dome five miles astern. A couple of hours of ineffective shelling made him a bit venturesome, but our gunners speedily showed him that it was unhealthy to come too close. We had plenty of ammunition, and we used it lavishly. With constant practice, too, our gunners began to get better. Nevertheless, about 3 o'clock the German gunners got out some better shells, and shrapnel began to rain on our decks. The man in the wheelhouse was struck by a splinter. A shot pierced the scupper over the boatswain's room. Another struck us abaft the engine room on the port side.

"For a while the fight was fierce. Then for half an hour no shots were fired, while the submarine maneuvered for position. Our ship was vibrating with the speed. Our captain paced the bridge, keenly observant. When the U-boat finally got the position he wanted and renewed the shell fire, our gun crew decided to let them have it as hot as our gun would stand. After a few minutes we landed a shell squarely on the German's back. It apparently disturbed him a good deal, for he stopped firing at once, then slackened speed, altered course, and submerged."—*N. Y. Times*, 10/3.

AMERICAN SHIP DAMAGED IN FIGHT WITH U-BOAT.—*Arrives at French Port with Bridge Smashed and Shell Hole through Smokestack.*—An American steamship, formerly a German vessel, arrived here with its bridge smashed and a shell hole through a smokestack, as a result of an encounter with a submarine.

The steamship defended itself with its guns on being attacked by the submarine.

A storm was encountered, during which the cargo shifted. The vessel made port with the greatest difficulty.—*Washington Evening Star*, 12/3.

TRANSPORT HAS BRUSH WITH U-BOAT.—The transport, safe at her berth, brings with it a crew, the members of which tell of the "brush" with the undersea vessel and of the courageous conduct under fire of those who manned the American guns, who, fighting against great odds, had won the day. All stand ready to brave the submarines again and the morale of the unit is unimpaired.

The transport made but one trip overseas. After clearing from an Atlantic port she joined her convoy and began the trip across the Atlantic without special incident until she neared the hostile zone. Then things began to happen. First her engine went wrong and she was compelled to drop behind the convoy, believing the trouble could be corrected in a short time. But this was not the case, and when the repairs were made the transport was stranded, but not alone, for, proceeding along her course, the lookout sighted a submarine dead astern, less than a mile away.

Enemy Shows Fight.—The gun crew of the transport was thrown into action and the stern gun was opened up at the enemy craft. At this time the undersea boat showed fight and, remaining on top of the water, began to drop shrapnel shells on the transport.

Closing her shrapnel guns, the submarine crew let loose one of her torpedoes, but the transport maneuvered in time to let it pass startingly close to her stern. Letting loose again with shrapnel, the German crew worked effectively, several shots finding their mark. The crew of the transport were having trouble with the range. To add to the transport's predicament, the chief gunner had his clothing nearly stripped from his body in a hail of small shell. He was wounded in the leg.

As usual there was an American present who jumped into the breach, took the place of the wounded chief gunner and proved himself equal to the occasion. The volunteer was a 17-year-old youth.

Make Their First Hit.—In the meanwhile the enemy craft had pulled to within 900 yards and sent up the signal: "Surrender, we are overhauling you." The gun crew on the transport answered with their first hit.

Again came the signal: "Surrender, we are overhauling you!" from less than 800 yards, but the transport replied with another hit, and the men swore they would die fighting rather than give a satisfactory answer to Hun challenge.

The shot that closed hostilities was a direct hit, which landed fairly on the periscope deck of the submarine, and with its bursting the undersea craft was seen to dive or sink. The crew, exhausted, but enthusiastic, did not linger to investigate the fate of the enemy ship.—*Evening Star*, 12/3.

AMERICAN CREW PLUNGED INTO ICY SEA TO SAVE NINE.—"Profound appreciation" for the work of the American destroyer *Parker* in rescuing survivors of the British hospital ship *Glenart Castle* was voiced by the British Admiralty's spokesman, Thomas James Macnamara, financial secretary of the Admiralty, in the House of Commons.

Mr. Macnamara made his statement in reply to questions by Sir J. Fortescue Flannery, member for the Maldon division of Essex, who called the attention of the Admiralty to the heroism and seamanship displayed by the crew of the *Parker*.

The Admiralty, said Mr. Macnamara, "profoundly appreciates the seamanship and very great gallantry displayed by the American destroyer *Parker*" in rescuing nine survivors of the *Glenart Castle*, which was sunk in the British Channel late in February. Two of the destroyer's complement deserve the greatest credit, he added, for their action in jumping overboard to effect rescues, in view of the temperature of the water, the choppy sea and the distance of the raft from which the rescues were effected. As to official recognition of these services, he stated, the award was not a matter for the British Government, but for the American authorities.

Lone Man Aboard Raft.—The *Glenart Castle* sank at four o'clock in the morning of February 26. The destroyer, although far distant, picked up a wireless message and hurried to the scene, where she searched the choppy sea for survivors. The first one was sighted at one o'clock in the afternoon—a lone man on board a raft.

In these submarine infested waters it was impossible for the destroyer to halt and launch boats. She threw a line to the survivor, but he was so weak that he became entangled in the line and was carried astern of the destroyer and severely cut by her propellers. He managed, however, to climb back on board the raft.

The destroyer circled the scene and, as it passed the raft again, Quartermaster J. C. Cole jumped overboard, succeeded in swimming to the raft and brought the man back to the destroyer. He was a fireman, Jesse White, of Southampton. He died later on board the destroyer, which continued her search, and in the course of the afternoon sighted three more groups of survivors clinging to rafts and wreckage, all of whom were similarly rescued.

SHELL BURST KILLS THREE OF CREW ABOARD THE "VON STEUBEN."—Three men on board the *Von Steuben*, one of the German vessels taken over by the government, were killed, the Navy Department announced, by a fragment of a shell which exploded while being fired. The extent of the damage is not indicated in the department's statement.

The statement of the Navy Department follows:

"The Navy Department is advised that three men were killed by fragments of a shell which exploded while being fired on the U. S. S. *Von Steuben*."—*N. Y. Herald*, 14/3.

LINER'S GUN CREW FIRED ON CONVOY.—William Lusso, a seaman of an American destroyer in the war zone, was killed and three others of the ship's crew were slightly wounded last January 16, when the armed naval guard on an American liner fired on the convoying destroyer after mistaking her in the darkness for an enemy submarine.

In making this known the Navy Department said Vice Admiral Sims had named a court of inquiry, which was making a thorough investigation. When the liner reached her destination the master gave a complete account of the accident to Admiral Sims, but it has not been made public, nor has there been any announcement as to the extent of the damage to the destroyer.

Admiral Sim's report on the accident was sent to the department by mail, but the name of the seaman was cabled when the destroyer reached port, the dispatch merely saying that he had been killed in an accident, and it was also announced by the department. The seaman's body has been sent to the home of his mother, Mrs. Barbara Lusso, Kansas City, Mo.

In the absence of first-hand details, officials of the Navy Department hesitated to comment on the case. It was suggested, however, that the destroyer might have run out of the place assigned her in the convoy and thus aroused the suspicion of the gun crew. Under certain atmospheric conditions, or at night, one of the new-type destroyers might easily appear to be a large submarine, her masts being about the same height and the deck being almost awash in a choppy sea.

So far as is known, this was the first accident of this kind among American war vessels in the war zone, but some months ago an American warship in the Mediterranean fired on an Italian submarine after it had failed to reveal its nationality when signaled to do so by the American. One man on the submarine was killed and another wounded.

An American naval court of inquiry which investigated the case recommended a reduction of a certain number in the grade of the commanding officer of the American vessel, but asked that clemency be shown because of the zeal and attention to duty shown by the officer. The Italian Government joined in the request, but the court's verdict was allowed to stand.—*N. Y. Times*, 15/3.

U-BOAT DESTROYED BY AMERICAN SHIP.—The American tank steamship *Paulsboro* was the victor on March 1 in a thrilling battle with a giant German submarine, a well-directed shot by the naval gun crew destroying the undersea craft.

Ninety shots were fired by the *Paulsboro* during the fight. She was within range of the guns of the submarine practically all of the time, and her deck soon was littered with fragments of shrapnel. When the steamship arrived recently at an Atlantic port she brought one wounded seaman and numerous scars of battle.

The submarine was sighted late in the afternoon of March 1, appearing at a distance of 8000 yards like a buoy. Within a minute after being sighted the first shot fired by her fell within half a mile of the *Paulsboro*. Gunners on board the American vessel responded immediately, but their first shots fell short of their mark, for the submarine was beyond range.

Americans Joyous in Battle.—Captain Frank W. Chapman, commander of the tank steamship, sounded the alarm and the vessel began to zigzag, going all the while at top speed. The *Paulsboro* is a new vessel of 6945 gross tons, was launched in 1916 and is of good speed. The submarine, however, was a faster craft and it soon was apparent the battle would have to be fought to a finish.

The crew of 37 men on board the *Paulsboro* went to work at their allotted tasks with shouts of glee. The men assigned to pass ammunition sang patriotic songs as they worked. Those below deck were envious of the men on the deck in danger from shrapnel.

The fight lasted more than 45 minutes, the two vessels closing the gap between them by more than 1000 yards. The last 20 shots from the *Paulsboro* fell close to the submarine, which also zigzagged. Then it was noticed that the U-boat had stopped firing, and finally a well-directed hit was seen to land right between her two wireless masts. Down she went, bow first.—*N. Y. Herald*, 18/3.

NORTH SEA AND CHANNEL

THE GERMAN RAID ON THE STRAITS.—A story of the German raid on the Straits of Dover on Friday morning, as related by a young able seaman who took part in it, is as follows:

"This is not the first fight of a similar character in which I have taken part during this war [he said], and yet, thank God, I am unhurt. But it was by far the worst of the four scraps which I have been engaged in. It was a terribly one-sided affair. The only thing I can compare it to is a picture of a man armed, say, with only a revolver or a pop-gun being expected to do battle in a small boat with an armed cruiser. It was a fine starlight night, and was so calm there was not a breath of wind and only a very slight haze. The fleet of drifters to which I was attached was on patrol duty. Shortly after 11 o'clock we received a signal telling us to be on the lookout for submarines. Being then off duty myself, I went down to my bunk, but before turning in I was reading a book. Suddenly, at about one o'clock in the morning, I was startled by heavy and rapid firing, the noise of hurrying footsteps on the deck overhead, and the issuing of rapid orders. My first impression was that we had seen, and were firing at, a submarine. Picking up my life-belt I hurried on deck.

"The noise of the cannonade at this time was almost deafening. The first thing I saw on reaching the deck was the blowing up of one of our drifters, which was not far away on our port quarter. She went up in the air enveloped in a great sheet of flame, in the midst of which I distinctly saw her two masts and her funnel fall with a splash into the water, sending up spray in all directions. For a moment I stood watching the awful sight, and then the thunder of additional guns coming rapidly from various directions at once indicated to me that we were up against something more than a submarine fight. I ran along deck aft as my mate shouted, 'There goes another one,' and he had scarcely made the remark before a third boat was blown up. Following the direction indicated, we saw that they were both enveloped in flames, but they were too far off for us to render them any assistance. Moreover, it was a case of having to look out for oneself, for just at this moment our own vessel had a marvellous escape.

"Suddenly, immediately astern of us, a searchlight shot out, sweeping the sea for some distance around, and by its light we were surprised to see the big dark hull of a German destroyer. She was bearing down on us at full speed, and had she continued on her course she would have cut us and sunk us easily. She was not more than 200 yards away from us. It is our belief that we owe our escape to being too close to be hit. We were sailing away from the destroyer, dodging all the time, and, fortunately for us, she missed us as she steamed northwards.

"The noise of the fight was terrible. Shells were falling in all directions. There must have been five or six German destroyers engaged in the raid, and they kept steaming in and out among our fleet of drifters, blowing us up like shuttle-cocks. We hadn't a ghost of a chance. The fight lasted for more than half an hour. Our boat was not touched, and fortunately not a single member of our crew received any injury. We got into harbor all right."

An official telegram from Berlin on February 15, says:

"On the night of February 14 our torpedo-boats, under the command of Captain Heinecke, made a surprise attack on the strong forces guarding the English Channel between Calais and Dover and Cape Grisnez and Folkestone. A large guardship, numerous armed fishing steamers, and several motor-boats were forced to give battle, and the major part of these was destroyed. Our torpedo-boats suffered no losses or damage, and have all since safely returned."—*Reuter.*

The Admiralty report stated that enemy destroyers made a swift raid on our patrols, of which one trawler and seven drifters were sunk, and retired rapidly before any of our forces could engage them.—*London Times, 22/2.*

The Admiralty statement regarding a raid reads:

"A swift raid was made by a flotilla of large enemy torpedo-boat destroyers at 1 a. m. to-day on our patrol forces in Dover Straits.

"The following craft, which were occupied in hunting a submarine which had been sighted by the patrol, were sunk:

"Trawler *James Pond*, drifters *Jamie Murray, Clover Bank, W. Elliott, Cosmos, Silver Queen, Veracity* and *Christina Craig.*

"After having sunk these vessels the enemy destroyers returned rapidly to the north before any of our forces could engage them."—*Washington Evening Star*, 10/3.

THE WAR AT SEA.—(By a Naval Officer.)—The resumption of raiding by the enemy destroyers from the Belgian ports, after a lapse of something like 10 months, must be regarded as significant of a development in plan rather than a change in policy. The German sallying tactics, which have been a feature each year of the war at sea, were foreshadowed by their technical writers long ago as necessary in view of our naval superiority. The purpose of the sallying tactics, which was to overpower by superior force or stratagem detached portions of the hostile fleet with a view to the reduction of that superiority, was also clearly explained. The manifestation of these tactics, their realization in action, is what is called the war of erosion or attrition. The submarine campaign is one form of the war of attrition, and in a certain sense it may be described as falling within that part in which the aim is to lessen the hostile force by stratagem. The submarine, as a rule, works alone with secrecy, silence and stealth.

But when the war began the idea of using the submarine in the way in which it has been used was as uncommon among the Germans as it was among ourselves. Had it been otherwise, von Tirpitz would have built a good many more underwater craft than he did, and Weddigen would not have been so surprised by his own successes. The original methods by which the war of attrition was to be carried out were mining operations and oversea raids. The former is still employed, and has been largely developed by means of the submarine minelayer, but the latter, although it has had some success, has been on the whole a failure, and when it is now attempted it is always worth while to look for another motive than that which is ostensible and on the surface. What, then, may be the significance of the resumed raiding in the Narrows?

The immediate object of the destroyer raid soon after midnight on Friday last was the destruction of the drifters, the outposts of the Dover patrol. These vessels may have formed a tempting target, for without escort they were bound to incur the serious danger of being overpowered by a much superior force. But unless the Germans were extremely well advised of the disposition of the British patrol their destroyers were also running risks, which, as experience has shown, might be ill-recompensed by the sinking of a few armed fishing craft. Raids of the nature of that of Friday night are extremely difficult to meet. It is of their essence that those who make them can select their own time for delivering the stroke, can choose the route by which to travel, and can determine exactly how far to go and when their own security demands return. They will make sure that the weather, the tide and the conditions of the night are all in their favor.

Two things may mar their plans. They may blunder in the dark into a bunch of British destroyers and get the worst of it, as they did in the encounter with the *Swift* and *Broke*, or they may find that they are cut off from home by a superior force, as nearly happened, apparently, when the Harwich Flotilla engaged and chased 11 German destroyers to within range of the guns of the batteries of Zeebrugge on May 11 last year. Then they only escaped by the skin of their teeth. Neither of these things happened on Friday night, and the raiders got back to their port without a fight, a stroke of ill-fortune for the British seamen, which demands sympathy and not censure. It would have been a source of much gratifica-

tion to them had they been given the opportunity for a display of those qualities they have so often shown during the war.

In the official *communiqué* it is stated that the vessels which were sunk by the enemy were occupied in hunting a submarine, when they were overwhelmed by the gun-fire of the enemy destroyers. A seaman also, who has been permitted to tell his share of the fight, says, "it was a fine starlight night, and was so calm there was not a breath of wind and only a very slight haze. The fleet of drifters to which I was attached was on patrol duty. Shortly after 11 o'clock we received a signal telling us to be on the lookout for submarines." And when he was startled in his bunk by the noise of firing, his first impression was that his ship was attacking a U-boat. These statements make clear the business of the drifters, and unless rumor is ill-founded, they had not been without success quite recently. Indeed, the *Daily Mail* states, with an appearance of authority, that four submarines had been destroyed in these waters during the past three weeks. If this was the case, there is here an indication of the secondary, but perhaps more important, motive for the raid. It may be regarded as certain that the destroyers never intended to come further than they did. It was their work to get rid of the drifters, and then to get back without damage or loss. But it seems more than probable that they convoyed a flotilla of submarines, or submarine minelayers, or both, which on the removal of the patrol was able to pass through the Straits and may presently be heard of again. The fact that a submarine bombarded Dover on the following night is in a measure evidence that something of the kind happened. Manifestly, the prevention of a raid in which the enemy had the advantage of being able to fire at every craft which comes within sight the moment it is sighted, while our officers have to discriminate between friend and foe before they fire, is one operation and the closing of the Straits to submarines is quite a different job. There is another reason why this raid may be regarded as a part of the submarine campaign. It bears in several respects a resemblance to that which took place on October 26, 1916, when it was admitted in Parliament that a number of our drifters on patrol duty in the Straits were sunk. That raid was followed by a recrudescence of submarine warfare, for returns prepared by the Liverpool Underwriters' Association showed that during October of that year 113 vessels, aggregating nearly 270,000 tons, were posted in the loss book. And in November the U-boat war on commerce was rampant in many localities. The submarines that committed those depredations may have got through the Straits or may have had to go round by the much longer route, but obviously there is every reason for closing the former passage by every possible means. For this purpose a vigorous offensive policy is clearly indicated and, after the recent changes at the Admiralty and elsewhere, is confidently expected by the nation.—*Army and Navy Gazette*, 27/2.

TWO HYDROAIRPLANES SINK U-BOAT IN ENGLISH CHANNEL.—An encounter between two French hydroairplanes and a German submarine in the English Channel recently probably resulted in the sinking of the U-boat after it had been bombed by the airplanes, according to an official announcement by the French Admiralty.

The airplanes were on patrol duty over the Channel when they discovered the submarine on the surface. They attacked it, after maneuvering so that the sun was at their backs, and the submarine plunged, but it did not disappear before the aviators had succeeded in dropping several bombs on or over the periscope.

While one airplane returned to the base for more bombs the other kept watch and saw the submarine emerge after a few seconds with a list to port of 45 degrees. After attempting to right her the submarine again disappeared, only to reappear a third time. Her instability increased, and suddenly the observer saw the submarine list still further and sink, so that even the periscope could not be seen.—*N. Y. Herald*, 16/2.

BRITISH HOSPITAL SHIP SUNK; ALL ARE SAVED.—The British hospital ship *Glenart Castle* was sunk at 4 a. m., February 26, in the Bristol channel, it is announced officially. There were no patients on board. Survivors were landed by an American torpedo-boat. Eight boats are still adrift. She was outward bound and had all her lights burning.—*Washington Evening Star*, 27/2.

FORTY-EIGHT LOST, 500 SAFE AS FOUR TORPEDOES SINK THE "CALGARIAN."—Official announcement was made by the Admiralty that the British armed mercantile cruiser *Calgarian* was torpedoed and sunk on March 1. Two officers and 46 men were lost.

There were 610 persons on board, nearly 500 of whom have been landed at an Irish port. The *Calgarian* was struck by four torpedoes.

The Allan line steamship *Calgarian* was a vessel of 17,515 tons gross, 568 feet long and 70 feet of beam. She was built in Glasgow in 1914. There are no published records of the recent movements of the *Calgarian*, which for some time has been in the service of the British Government. The last report given out concerning the liner was in April of 1916, when she sailed from Halifax for England with Canadian troops. A most unusual circumstance in connection with the sinking of the *Calgarian* is the fact that she was struck by four torpedoes. So far as published reports have shown in no previous case has a merchantman been subjected to such a heavy attack by submarines. Evidently the Germans concentrated U-boats to ensure the sinking of the vessel.

The people of this town (an Irish port), who a few days ago won the gratitude of the American people by their kindness to the survivors from the *Tuscania*, have extended their hospitality in the last few days to nearly 500 men from the *Calgarian*, one of the finest auxiliary cruisers in the Atlantic service. The *Calgarian* was torpedoed in the late afternoon not far from the place where the *Tuscania* met her doom.

The ship's bell had just sounded 4 o'clock when a torpedo struck. The shock was so slight that it was thought the vessel had merely touched a mine astern. It was hoped to get her safely to port.

A considerable time later a second torpedo struck her, followed quickly by two more. By this time there were several trawlers and patrol vessels in the vicinity, and the work of disembarking the crew was hastened. By good fortune the *Calgarian* remained afloat on an even keel for some time, notwithstanding the four torpedoes.

It was possible to take off nearly all the crew except the men in the stokeholds and others who had been injured by the explosions.

Most of the rescued men were brought here. Hot meals and dry clothes were provided, and there were turned over to them the same beds which the *Tuscania* survivors had occupied a few days before.—*N. Y. Herald*, 7/3.

U-BOAT ENCOUNTER.—*Trawler's Captain Tried to Ram Her, Then Knocked Off the Periscope.*—When a vessel is in danger of submarines anything will do as a weapon of defence, as is shown by the story of a captain of a British trawler who used a coal shovel with good effect against a German U-boat. The trawler, according to the story told by one of the crew, was in the North Sea in a stiff breeze when the skipper saw a periscope crawl through the breaking surface of the sea about 100 yards off. There was no gun aboard, and the trawler's best speed was less than 8 knots.

"It was a situation to dismay most men," said the sailor. "Our skipper, however, has a fighting spirit. A touch of the wheel sent the trawler's blunt bows pointing at the submarine's whaleback, and we wallowed menacingly toward the pirate. The U-boat swung round to avoid the impact and the sides of the trawler scraped along the sides of the submarine. The periscope was still well out of the water, but was beginning to slip down as the submarine dived.

"The skipper bawled for a hammer, a crowbar, anything that would hurt. One of the crew thrust a coal shovel into his hand and he scrambled on the bulwarks and leaned over, two of the crew hanging to his coat so that he wouldn't fall overboard. Backward and forward he swung the heavy scoop at the fragile periscope, and the third blow reduced it to fragments.

"The submarine commander, hearing the noise and wondering what new and horrible device the enemy had invented, crept to his periscope to have a look, but all was black. He was blind, and the trawler got away safely."—*N. Y. Times*, 10/2.

SHIP HALTED BY ZEPPELIN.—How his vessel was halted by a Zeppelin and a German submarine, all in the space of an hour, is the story being told by the master of a Swedish steamer now in port.

"The master said that in the same ship he has now in port he was bound from Gothenburg for England. In the North Sea a Zeppelin hovered over his ship and ordered him to stop. He at once complied with the voice from the air.

"The the Zeppelin maneuvered until it was about 300 feet above the steamer, when the commander of the huge dirigible ordered, through a megaphone, the captain of the steamer to open his papers and spread them on the deck.

"This was done. The master of the Zeppelin placed a glass to his eyes, and, reading that the German consul at Gothenburg had given the ship a clearance through the war zone, declared all was correct and told the master to continue.

"This was not done, however, until a U-boat swashed out of the sea, shook all the water off her deck and ran alongside the Swedish ship."—*Evening Star*, 24/1.

BALTIC AND SKAGERRACK

NAVAL POWER IN THE BALTIC.—*Swedish Concern about the Aaland Islands.*—In conversation with the Petrograd correspondent of the Swedish Socialist newspaper *Politiken*, the Russian Commissioner for Foreign Affairs, M. Trotsky, stated that among the documents found at the Foreign Office was a secret treaty between Germany and Russia, signed in 1907, by which the German Government formally consented to Russia's fortifying the Aaland Islands, declaring that it would not consider such an act as constituting an infringement of the Treaty of Paris. M. Trotsky added:

"I do not consider that this justifies Russia in fortifying the islands, but it proves that in so doing she had the consent of Germany. The whole situation in the Baltic is now altered by the German possession of Moon and Dago islands, which she will fortify, creating a Baltic Gibraltar commanding the whole sea. The interest of Russia, Finland, Sweden, and Denmark is one in this matter. It is only at the general peace negotiations that a final settlement can be attained. We are, therefore, of opinion that Sweden will have to be represented."

When this statement, telegraphed from Petrograd, appeared in *Politiken*, the German minister here lost no time in sending a communication to the Swedish press, pointing out that the secret treaty therein mentioned only concerned *une abrogation éventuelle* of the servitude imposed on Russia by the Paris Treaty of March 30, 1856.

Baron von Lucius added that Germany's declaration regarding this abrogation naturally implied that Russia should have previously obtained Sweden's consent to it.

These statements are creating considerable sensation. The press, in discussing them in connection with recent phases of the Aalands question, remarks that, while they establish that Germany already in 1907 had virtually signed away the treaty guarantee given to Sweden in a matter of vital importance to her, it was equally known by another of M. Trotsky's

revelations of diplomatic documents that representations to the same effect had been made at the time to France and England. What reception these had met with was unknown, but there was nothing to prove that their request had not been more or less tacitly conceded.

The British Attitude.—In view of the feeling that this controversy is creating, I determined to ask the British Legation for some authoritative statement showing what the attitude of the British Government had been on that occasion. I have been authorized to state that in June, 1907, the Russian Government approached the British Government regarding the abrogation of the Convention of 1856 respecting the Aaland Islands. Sir Edward Grey, in reply, pointed out to the Russian Ambassador that if the Aaland Islands were fortified Sweden would feel herself in a very disadvantageous position, and suggested that a conference of the four powers, Great Britain, France, Russia, and Germany, should be held to consider the question in connection with the treaties of 1855 and 1856. No further discussions on the subject took place between the two governments until December, 1907, when M. Isvolsky spoke about the Aaland Islands to Sir Arthur Nicolson, British Ambassador in Petrograd. Sir Arthur Nicolson reported M. Isvolsky as saying that he understood that his Majesty's Government's chief objection to the abrogation of the Treaty of 1856 being discussed in the summer was that at that moment it would have been painful to Sweden, that his Majesty's Government were desirous, if the Aaland Islands question was brought into discussion, that this should be done in connection with the whole Baltic question at a conference of the interested powers, Germany included. In a later dispatch, dated the same month, on the same subject, Sir Arthur Nicolson reported that he spoke to M. Isvolsky as follows:

"I observed that I understood my government reserved their action as to the Aaland Islands until they were in possession of the text of any arrangement concerning the Baltic. I presumed that when M. Isvolsky had settled matters with Sweden he would address himself to London and Paris, and the Cabinets would decide in what light they would regard the arrangements that might be concluded."

Further, at the beginning of January, 1908, Sir Edward Grey informed Count Wrangel, Swedish Minister in London, that the British Government had not resumed the discussion with the Russian Government about the abrogation of the Aaland Islands treaty, and that, before proceeding with any discussion of this abrogation of the treaty, he would like to see the draft of whatever was proposed. Regarding the matter in the light of these facts, it is clear that the British Government had no intention of acting in the matter until Sweden had been duly consulted.—*London Times,* 22/2.

RUSSIAN TRANSPORTS SUNK BY GERMANS.—Two Russian transports were attacked and sunk by German destroyers after a fight south of the Aaland Islands, according to a Copenhagen dispatch to the Exchange Telegraph Company. Having taken possession of the Aaland Islands under the terms of the recent treaty signed with the Bolshevist Government, the Germans may have assumed that the Russian transports had no business in the waters to the southward of the islands.—*N. Y. Times,* 10/3.

TWO AMERICANS SHIPWRECKED ABOARD RAIDER'S PRIZE VESSEL.—The Spanish steamship *Igotz-Mendi,* with a German prize crew from the Pacific Ocean on board, is ashore near the Skaw lighthouse. Two of the prisoners aboard are Americans.

The prisoners on board the *Igotz-Mendi* were taken from six ships which had been sunk. Several of the prisoners had been aboard the vessel for eight months while she cruised in the Pacific Ocean.

Twenty-two persons, including nine women, two children and two Americans, have been landed by a life-boat from the Skaw.

The Danish authorities have interned the German commander of the *Igotz-Mendi*. The German prize crew refused to leave the ship.

There had been an epidemic of beri-beri and scurvy on board the vessel.

Nine women and two children were among the rescued passengers, who included one Dane, one Swede, one Norwegian, two Finns, two Hindus, one Chinese, one Turk, one Greek, one Chilian and two Americans. The remainder of the prisoners were British. Many of them suffered from inadequate nourishment in the last five weeks.

[The German auxiliary, the *Wolf*, has reached port after a raiding expedition of 15 months in the Atlantic, Pacific and Indian oceans, the German Admiralty announced. A British statement gave the names of 11 ships assumed to have been destroyed by the *Wolf*, one of which was the *Igotz-Mendi*, 4648 tons gross. In addition to this vessel another captured ship, the *Turritella*, was fitted out as a raider, but was quickly sunk. The Skaw, where the *Igotz-Mendi* has grounded, is the northern extremity of Jutland, Denmark.]

The steamship *Igotz-Mendi*, according to a dispatch from Copenhagen to the Exchange Telegraph Company, was captured by the German auxiliary cruiser *Wolf* nine months ago in the Gulf of India. The German navigators who were placed aboard had been following the *Wolf* ever since. All the persons who had been held prisoner on board the vessel, the correspondent adds, have been taken ashore.—*N. Y. Herald*, 27/2.

MEDITERRANEAN

STEAMSHIP REPORTS SINKING OF A SUBMARINE.—An American steamship arriving recently at an Atlantic port reported having sunk a German submarine in the Mediterranean on January 18 last, after a running fight. The steamship was not hit.

On the outward voyage the same craft was attacked in the Mediterranean by two submarines. One was sighted off the bow of the vessel, and when the captain attempted to ram the undersea boat she submerged and made off. At the same time the gun crew fought off another submarine from the stern.

The crew of the vessel reported that British patrol boats captured two submarines off the Canary Islands on January 7.—*N. Y. Herald*, 2/4.

FIFTEEN U-BOATS IN MEDITERRANEAN SUNK IN A MONTH.—Fifteen German submarines operating in the Mediterranean have been sunk in one month by Japanese and American destroyers it was learned yesterday when Captain Sato Yamamoto, Naval Attaché of the Japanese Embassy in Rome, arrived at an Atlantic port. The fighting men from Nippon and Yankeeland worked side by side and in close cooperation with squadrons of war vessels and of seaplanes of the Allies.

Captain Yamamoto said that practically all Austrian submarines have been cleared from the Adriatic and the Mediterranean as the result of excellent work on the part of the Italian Navy. Their places have been taken to a great extent, however, by German U-boats, manned by German crews.

"Airplanes of the Allies have discovered that Trieste is used by the Germans as a base for submarines. The port is an assembling place for the U-boats, which are shipped from Germany in parts. In a few months I predict the world will see a naval attack by the Allies on Trieste. This, I hope, will impair its usefulness to the Germans. In the harbor, it must also be remembered, there are several vessels of the Austrian fleet."—*N. Y. Herald*, 7/3.

A GERMAN RAIDER.—In each of the four winters which have elapsed since the outbreak of the war a German surface raider has succeeded in making depredations on the shipping of the Allies. The first of these commerce destroyers was the *Karlsruhe*. In the two following winter seasons the *Moewe* successfully eluded the British blockading fleet and bagged a number of enemy merchant ships. Word came from Berlin that the auxiliary cruiser *Wolf* had reached a home port safely after an extended cruise in the Atlantic, Indian, and Pacific oceans, in the course of which much damage was inflicted on hostile shipping and many prisoners and much loot secured. Considering how the seas are being policed, it certainly seems extraordinary that a German man-of-war should have been able to remain at sea for 15 months without being caught and without once putting into a friendly port. The return of the *Wolf* clears up certain mysteries, like the fate of the long-overdue steamer *Wairuna*. The presence of this German raider in southern waters may also account for floating mines having been found in the regular steamship lanes near the Australian coast, which neutral vessels in the employ of the enemy have heretofore been supposed to have planted.—*Nautical Gazette*, 9/3.

BRITISH-TURKISH SEA ACTION.—At the time of writing (Jan. 22), the story of the *Goeben* and *Breslau* sortie from the Dardanelles was so incomplete that any discussion of so interesting an adventure would have been premature. The *communique* of the 23d, however, gives a far more detailed picture of what happened, and corrects several statements in the previous accounts. But, even now, particulars of many major points are still to seek. Briefly, the story we are told is this:

Lizard, a 750-ton destroyer, armed with two 4-inch and two 12-pounder guns, discovered *Breslau*, with the *Goeben* a mile astern, at 5.30 on the morning of January 24, when she was about two miles from the northeast point of Imbros. The German ships were on a northerly course and steering towards the southeast of Cape Kephalos. *Lizard* at once gave the alarm and engaged the two German ships, at a range of about 11,000 yards, she being under heavy fire the whole time, straddled often, but never hit. She was, naturally enough, not able to turn either ship from her course, and was prevented from closing to torpedo range by the accuracy of *Breslau's* fire as the distance shortened. There was, then, nothing to prevent *Goeben* from getting opposite the mouth of the harbor where the monitors were lying. *Lizard* had kept between *Goeben* and the harbor and, no doubt in response to her original alarm, *Tigress* came out and joined her, when both destroyers did what they could to shield the two monitors by smoke screens. The protection, however, was insufficient and within 40 minutes of the German ships being sighted, first *Raglan* and then *M-28* had been "heavily hit" and sunk. The enemy, having accomplished their mission, turned south, not apparently with the idea of returning up the Dardanelles, but on some other mission. They were followed by *Lizard*, now accompanied by *Tigress*, who, at seven o'clock, saw *Breslau* run into a minefield, in which she seems to have struck, not one but several mines, so that she sank within ten minutes of the first explosion. *Goeben* was apparently leading, for, on seeing *Breslau* sink, she circled round her once and then continued her southerly course. There then came on the scene four Turkish destroyers accompanied by an old cruiser. *Lizard* and *Tigress* engaged the destroyers at once, hit one of them "repeatedly" and drove them pell mell up the Straits. But *Goeben* continued past the Straits, still going in a southerly direction, when an attack by our aircraft "forced" her to turn.

The account does not say whether *Goeben* was hit by this first attack. But the presumption is that the bombs must have fallen close enough to make her realize that the risk of trying to add to her successes by continuing her range further afield was prohibitive. But the decision was taken at an unfortunate moment for, in the actual act of turning, she struck a mine

herself, the injury from which must have been serious, for not only did she settle down aft, but developed a list of from 10 to 15 degrees. Damage of this kind was bound to affect her speed, and it is possible that one of the propeller shafts may have been injured as well. At any rate, her procedure up the Dardanelles was slow. All the four Turkish destroyers that had been driven in by *Lizard* and *Tigress* now turned to escort *Goeben*—from which one concludes that the boat that was hit could not have been very seriously damaged. The Turks also sent out aircraft to put a stop to further attacks from the sky and, in the encounters that ensued, one of our seaplanes seems to have been destroyed. But the others in the meantime continued to attack not only with energy but with effect, for no less than four direct hits were recorded—two before and two after *Goeben* was run ashore, 100 yards from the lighthouse at Nagara Point. *Lizard* and *Tigress* continued to follow up *Goeben*, until the fire from the batteries became prohibitive. The gallant captains of these enterprising craft felt the better justified in desisting when they realized how effective our attack from the air had become. Having left the Dardanelles, they proceeded to the rescue of the *Breslau* survivors, a work, however, in which they were disturbed by an enemy submarine. The story does not tell us how many German lives were lost by this very ill-timed intervention. Later accounts record further direct hits on the *Goeben*, and there is one story to the effect that her decks are now awash. But she has survived so many misfortunes that it needs some hardihood to assert, as so many have done, that she is now finally destroyed.

One can look at this story from two points of view.

What do these events tell us about the art of fighting at sea, viewing them as a naval operation only?

Secondly: What is the political significance, if any, in the sortie? Let us deal with the technical question first.

Imbros lies about 14 or 15 miles from the nearest point of the Gallipoli Peninsula. On a clear day with a good telescope, magnifying, say 45 diameters—not a high power for use in Mediterranean sunlight—objects at Imbros would appear to an observer on any high point like Achi Baba, to be about 600 yards off. But as we know from the despatch describing the first fortnight's work of our submarines in the North Sea, the under-water boat is, in many respects the most efficient scout there is, and all information got by direct telescopic view and by submarine, could easily enough be confirmed and multiplied by aircraft. In deciding to make this raid, therefore, we must realize that the enemy knew exactly what he was doing, exactly what force there was opposed to him; knew, in fact, that he was running no risk of encountering any craft of a fighting power superior to, or even equal to, that of the ex-German battle cruiser. It is important that we should realize this because, when we come to the political considerations lying behind the raid, the degree of risk run by these ships is highly material to their comprehension. Next we must also assume that, at the time when Imbros was made a base for the operations against the Gallipoli Peninsula, it was not thought necessary to protect it by heavy guns. In those days the idea that *Goeben* would come out and either raid the harbor or attack a squadron of our older battleships, would have seemed, as indeed it was, chimerical. *Goeben*, therefore, had nothing to fear from any armament except those of the monitors. The smaller monitor, *M-28*, can be ruled out. She was probably armed only with one 6-inch and one 9.2 guns; there would have been, therefore, no guns to take into consideration except *Raglan's* two American 14-inch rifles. We are not, it will be observed, told anything of *Raglan* engaging *Goeben*. And, if she had engaged her, we surely should have been told. Such an action would have been the first between a monitor and a modern seagoing ship, and very few shells from the monitor might have done decisive damage to the German battle cruiser.

We know that *Raglan* was warned at 5.20 and, though we do not know exactly when the *Goeben* opened fire, yet the interval before she cleared the point that opened up the harbor must have been considerable—for she was soon steaming seven miles out at sea and was still some distance to the south when she was first observed. A very brief interval would have been sufficient for *Raglan* to have got ready for action, if we assume, first, that the only preparations were to man the turret and the fire control station, and that all was well with the ship at the time. We must, then, I think, conclude that *Raglan* was unable to engage, and that the explanation of this is that, not anticipating the possibility of a raid, she was lying with her bows facing inland, and was unable to turn to bring her only guns into action in the interval between receiving *Lizard's* wireless and *Goeben's* opening fire. And it is the more probable that this is the explanation from the fact that *Goeben* took the risk. It is just the kind of detail that might have been ascertained on Saturday evening by aircraft, and may have been the deciding factor in the determination to make the raid.

So far, then, it is quite probable that things went, not only as the enemy hoped, but as he had every right to expect from the information he had been so diligent as to procure. His success indeed had been complete. The intervention of *Lizard* and *Tigress*, though as daring and skilful as it could possibly have been, was nevertheless entirely without results.—*Land and Water*, 31/1.

TURKISH WATERS AND BLACK SEA

BRITISH SUBMARINE SUNK.—The following Turkish official report, concerning operations in the Dardanelles, was issued by the Press Bureau last night (February 4). It was published by the enemy on January 30:

The English submarine *E-14* was sunk off Kum Kale. Seven men were saved. A second English submarine, the *E-82*, had its periscope shot off near Nagara. After further hits a large [? oilspot] was observed, so that this boat may, almost with certainty, be regarded as also having been destroyed.

An English seaplane—Shore type [? Short type] was forced by machine-gun fire to land at Nagara. Its crew were taken prisoners. The machine has been salved in undamaged condition.—*Admiralty, per Wireless Press.*

In reference to this Turkish report the Admiralty now makes the following statement:

H. M. submarine *E-14*, Lieutenant Commander Geoffrey S. White, R. N., proceeded to the Dardanelles on the night of January 27 with instructions to complete the destruction of the *Goeben*. Our aircraft, which were also sent to cooperate with *E-14*, reported considerable anti-submarine activity in the Straits.

An official Turkish wireless report has been received stating that *E-14* has been sunk off Kum Kale (the south point of the entrance to the Dardanelles), and that there were seven men saved; no names are given.

The British Commander-in-Chief, Mediterranean, reports that all the other submarines employed in that area have returned to their bases, and that only *E-14* is missing. The latter part of the Turkish statement [that *E-82* might, almost with certainty, be regarded as destroyed] is therefore incorrect.

At noon on January 27, the day on which *E-14* was sent to the Dardanelles, the *Goeben* was still ashore, but a reconnaissance carried out by the British about midnight the same day "established the fact that the *Goeben* was no longer on shore on Nagara Point." It had been beached a week previously after having struck a mine outside the Dardanelles. On that occasion the *Breslau* struck a mine and sank.

The version of the Turkish *communique* received through Reuter's Agency says that *E-14* was sunk "by the Dardanelles batteries."—*London Times*, 5/2.

THE "GOEBEN."—The fact as announced by the Admiralty to-day that the *Goeben* has been refloated makes another change in the naval situation in the Sea of Marmora and the Eastern Mediterranean. It seems rather a pity now there should have been so many premature rejoicings over her destruction. The satisfaction that was expressed when the cruiser was supposed to have been put out of action for good was natural in the circumstances. It appeared to make certain, first, that the influence exerted upon the Turks by the presence of this vessel off Constantinople would be removed. That was the political aspect of the affair. From the naval standpoint benefit would be derived from her removal, since it would permit of a rearrangement of forces in the Eastern Mediterranean, and particularly at the Dardanelles. It is beyond a doubt that the accomplishment of floating the ship in spite of all the allied efforts to complete her destruction will have its effect upon the Turkish mind. We may take with many grains of salt the statement from Berlin that the *Goeben* is quite fit for service, but so far as the Turks are concerned her presence once more off the capital—and we may be sure that great efforts will be made to get her there—will restore her prestige whether she is battle-worthy or not. It is quite likely that her return will not be an unmixed source of rejoicing to the Ottoman Government, and still less to the Ottoman peoples. The sight of her will, however, assist to reforge the shackles which bind Turkey to the Central Powers, and thus the political result of what has happened has an important significance. Moreover, however, badly damaged she may be, it is manifest already that this will be minimized, and it may even be claimed that although the *Breslau* was lost, the sinking of the two British monitors constituted a victory for the Turko-German cause, and a triumph to be celebrated by bell-ringing in Berlin.

Regarded from a naval standpoint, the continued existence of the *Goeben* is of no less moment. She has been badly damaged before, and if all accounts are true, both by gun-fire and mine, while it is clear that the resources of Constantinople have proved quite equal to her repair and to fitting her for renewed action. How long it will take, or whether, indeed, it is practicable to make the ship effective again must depend upon the extent of her injuries, but the Germans will certainly attempt the task. In any case, it will be well, in default of further information on the subject, to regard this as a possible event. Obviously, therefore, it will not do to give her the opportunity in a few months time, or perhaps even earlier, to repeat the adventure of ten days ago. It may be unpleasant, or interfere with other plans, but it will hardly be wise to entrust the blockade of the Straits to monitors and mines again unless we are prepared to risk the recurrence of another regrettable incident.—*Army and Navy Gazette*, 2/2.

PACIFIC AND INDIAN OCEANS

BRITISH CAPTURE GERMAN PRIZE CREW.—According to Captain Pearse, a member of the Red Cross, a British gunboat surprised a German prize crew aboard the British vessel *Turritella* while they were laying mines off Perim. The Germans took to the small boats and blew up the *Turritella* while Chinese were in the stoke hole and engine room. The gunboat captured the Germans, who recently were tried at Bombay for murder.—*N. Y. Herald*, 9/3.

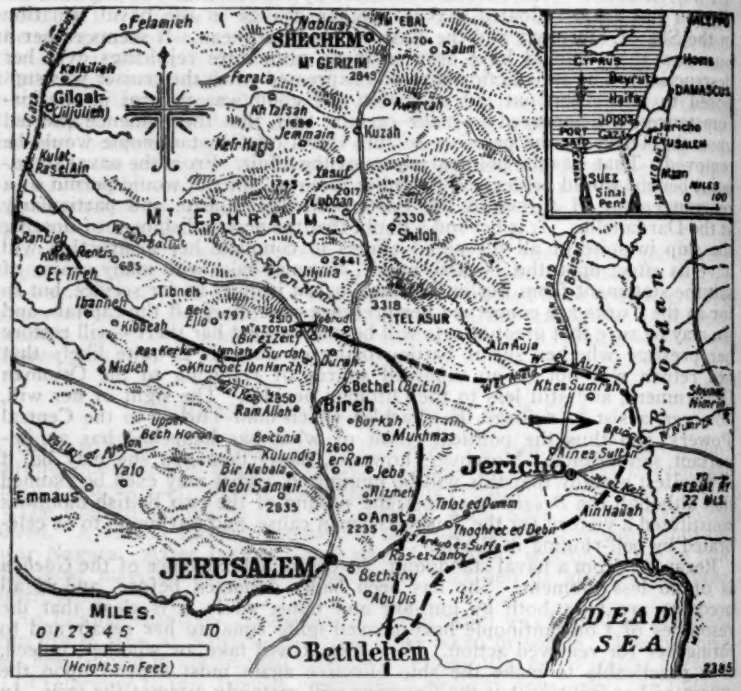
[The *Turritella* was captured by the sea raider *Wolf*, it was announced at Berlin on February 26. The British Admiralty later announced that she was an unarmed merchantman.]

Account of the *Wolf*, see p. 927.

Account of the *Igotz Mendi*, see p. 926.

GENERAL NOTES

General Allenby's troops have occupied Jericho and advanced to the Jordan and the Wadi el Auja. Beyond the Jordan, 25 miles to the east, is



THE FALL OF JERICHO

the Hedjaz Railway, which carries the Turkish communications to Arabia. The thick black line shows the starting point of the advance on February 19.—*London Times, 23/2.*

GERMAN OFFENSIVE IN WEST NOT EXPECTED TO BE LAUNCHED UNTIL IT IS COMPELLED BY GENERAL STRATEGIC EXIGENCIES.—The War Department authorizes the publication of the following review of the military operations:

The period of inactivity in the west is being prolonged.

Though the raids now taking place would in the past have been considered important engagements, nevertheless, owing to the fact that they are merely of minor tactical value, they cannot be held to be major operations.

While hostile preparations for an offensive in the west are not slackening, it is becoming more evident that the enemy will launch this offensive only if compelled to do so by the exigencies of the general strategic situation.

While fresh German divisions are reported as arriving in the west it is important to note that the density of enemy forces has nearly reached a point beyond which it will be impracticable to go, for should any large

additional body of men be massed, the chances are that the congestion of the lines of communication will become so great as to make it impossible to maintain the flexibility of maneuver, which is so essential.

Our own forces in France have been constantly in action. Our troops are now in the trenches at five different points. We undertook our first assault against German positions, unassisted by any allied contingent.

At dawn on March 11, after a preliminary bombardment lasting three-quarters of an hour, we drove a highly successful raid against a German trench segment.

Our men penetrated the German line to a depth of 300 yards. The enemy was driven off after a hand to hand fight, whereupon our contingent returned to our lines.

At three places in Lorraine American troops, acting in co-operation with small French detachments, raided German trenches. Two of these operations were carried out simultaneously, each on a frontage of some 600 yards.

After a prolonged bombardment the attacking units were able to reach their objectives. Few of the enemy were found in the first line trenches and the attackers swept forward into the German second line. Our men remained for nearly an hour in the German positions and retired after inflicting much damage and capturing a considerable quantity of matériel.

There has been a decided increase in sniping, owing to more favorable weather conditions.

Our artillery was also very active. We kept up a vigorous bombardment on the rear areas opposite our Toul sector. Near the Swiss border where another detachment of our men are in the trenches, hostile bombardments were frequent.

The arrival of our Secretary of War in France is noted.

During the past week the Secretary has had interviews with the leading French authorities and is about to undertake a careful inspection of our schools, training areas, rest camps, as well as those sectors of the front where our forces are in action.

The Western front, from the North Sea to the Aisne, was the scene of much hard fighting. In Flanders, the British were able completely to re-establish themselves in the advance posts near Polderhosk Ridge and Houthulst Wood, which the enemy had captured during the preceding week.

The Germans initiated a number of important raids undertaken on a wide frontage which, had they proved successful, might possibly have developed into engagements of a broader character, as the blows driven in the vicinity of Paaschendaele, Houthulst Wood, and along Menin Road could readily have been linked together into an offensive having a frontage of 8½ miles.

The British successfully raided the German lines from south of St. Quentin to Houthulst Wood.

Along the French front the Germans centered their assaults in Champagne. However, they were unable to make any headway. On the other hand the French retook some trench elements in which the enemy had gained a foothold west of Mont Carnillet.

The Germans carried out a number of air raids against London and Paris. Allied aviators raided German industrial centers of the Rhine region.

In the Italian theatre the arrival of further hostile units and the concentration of material coming from Germany is noted in the area east and west of the Lake of Garda, which would point to hostile operations having Verona and Brescia as their objectives. In the eastern theater the enemy has stopped advancing in the north, while consolidating the territory gained in the south.

The chief operation of the week culminated in the capture of Odessa. An Austrian column bearing down from the north formed a junction with

a German column which had advanced rapidly across Bessarabia. The occupation of Odessa will, no doubt, be of economic importance to the enemy.

In Finland fighting continues. German infantry has landed at Abo and the arrival of important additional German forces on the Aaland Islands is reported.

In Palestine the British continue to advance. They have now pushed their lines 18 miles north to Jerusalem.—*Official Bulletin*, 16/3.

RULES FOR TRANSMISSION OF MAIL TO AND FROM PRISONERS OF WAR

OFFICE OF SECOND ASSISTANT POSTMASTER GENERAL,

February 25, 1918.

All mailable articles (including parcel-post packages not exceeding 11 pounds in weight) to or from prisoners of war are entitled to transmission in the international mails free of postage.

Must be Plainly Addressed.—All mail shall be plainly addressed to the prisoner of war, giving name, designation, and name of camp at which he is held, and be marked "prisoner of war mail, via New York." In addition it should bear the name and address of the sender, and in the case of parcel-post packages the relationship of the sender to the prisoner of war addressed should be clearly stated. Parcel-post packages for American prisoners in enemy countries may not be sent by organizations or societies, and only one such package per month may be sent to any one prisoner of war, the limit of weight for each package being 11 pounds. If more are received, the one apparently from the prisoner's next of kin will be forwarded and the others held in New York pending communication with the sender, with whose content such excess packages may be forwarded to some other prisoner of war who, in that particular month, has received no package from any source. If such consent be not given, the packages will be returned to the sender.

Limited to Certain Articles.—Only the following articles may be included in packages sent to American prisoners of war:

Belts (not made of leather), brushes (hair, hand, tooth, shaving, and shoe), buttons, candy (hard), cigars, cigarettes, comb, crackers or biscuits, gloves (not made of leather), handkerchiefs, knife (pocket), needles and thread, pencils, pens, penholders, pins, pipes, safety razors and blades, shaving soap, powder or cream, scarf, shirts, shoe laces (not made of leather), smoking or chewing tobacco, soap (toilet), socks, sweaters, tooth powder (paste or liquid mouth wash), towels, underwear, personal photographs, periodicals published prior to beginning of the war.

All Mail Censored.—No communication will be permitted to contain any statement, allusion, or suggestion of a nature to be of assistance to an enemy or ally of an enemy, nor shall any statement therein contained relate to any commercial transactions.

All mail will be censored by the executive postal censorship committee in New York and will then be placed in pouches labeled to the American Red Cross central committee for prisoners of war, Berne, Switzerland.

OTTO PRAEGER,

Second Assistant Postmaster General.

—*Official Bulletin*, 27/2.

BIG GUNS OF AMERICAN MAKE ON BATTLE FRONTS.—American built ordnance of the latest type and heaviest caliber—10-inch, 12-inch and 14-inch rifles—are in service on the sector of the Western front held by the American Army and on the Italian front, it was learned at the War Department. The general belief has been that very few American heavy guns were in Europe.

The guns sent to Italy include 14-inch rifles, both of 45 and 50 caliber. The former was considered the most powerful naval weapon in existence until the commissioning of the British battleships of the *Queen Elizabeth* class, with 15-inch guns.

American experts still believe that the 14-inch 50 caliber rifle is harder hitting and more accurate even than the larger British weapon.

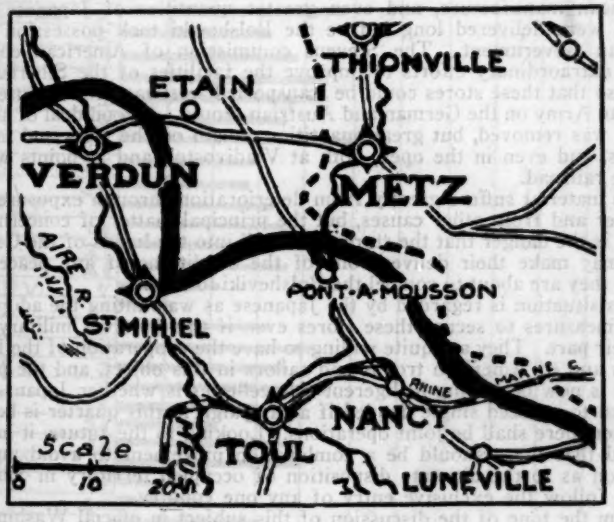
Reports from Italy say the results achieved by the heavy American ordnance already has elicited expressions of admiration from the Italian gunners.

In addition to heavy naval ordnance General Pershing has received reserve 12-inch rifles designed originally for installation in the coast defences of the United States. When this country entered the war there were a substantial number of these guns in American arsenals, but the chances of their being needed here was deemed so small that the War Department did not hesitate to ship them abroad. Mounted on specially designed carriages they are now along the American sector.

Mounted for high angle fire, as they will be when used in land operations, the 12-inch rifles have an estimated range of not less than 35,000 yards, or substantially 17 miles. The 14-inch gun has a proportionately greater range.

Larger naval guns are now being built, as future American battleships are to have 16-inch guns of both the 45 and 50 caliber. No details of this weapon have yet been permitted to be published, however.—*N. Y. Herald*, 26/2.

The authorized announcement, says the New York *Times*, which publishes this map, that American troops have taken over a sector of the



WHERE OUR TROOPS FIGHT IN FRANCE

French front northwest of Toul, indicates that they are holding a part of the line on the eastern side of the St. Mihiel salient. The exact location, for obvious reasons, cannot be disclosed as yet.—*Literary Digest*, 16/2.

FIRST AMERICAN BATTLEPLANES ON WAY ABROAD.—America's first contribution to the air equipment of the allied armies—modern battleplanes of the most advanced type, equipped with Liberty motors—is now on the way to France.

That announcement was authorized by Newton D. Baker, Secretary of War. The initial shipment marks the beginning of the fulfillment of the

huge aerial program laid out by the United States soon after the declaration of war. The productive stream has begun to move, and it is to be expected that henceforth it will flow in constantly increasing volume.

The difficulties that have been overcome, the problems that have been encountered are outlined in the War Department statement. In spite of these, the United States is somewhat ahead of the tentative program according to which American airplanes were not due in France until July.

The airplanes are equipped with the new Liberty motor, the 12-cylinder type, which now is being produced in quantities.—*N. Y. Herald*, 21/2.

JAPAN WANTS TO ENTER SIBERIA AND SAVE ARMY STORES.—Japan has directed inquiries to the Entente Powers and the United States Government to test their feeling toward a proposal to institute joint military operations in Siberia to save the vast quantities of war supplies stored at Vladivostok and along the Siberian Railroad. Criticism at home of the failure of Japan to play a larger part in the war is said to have been influential in bringing about the negotiations.

Officials here refuse to discuss this subject for publication, but it is understood that so far as America is concerned the proposal when first broached was not wholly acceptable, though the exchanges on the subject, which are still in progress, may result in modifying the government's attitude.

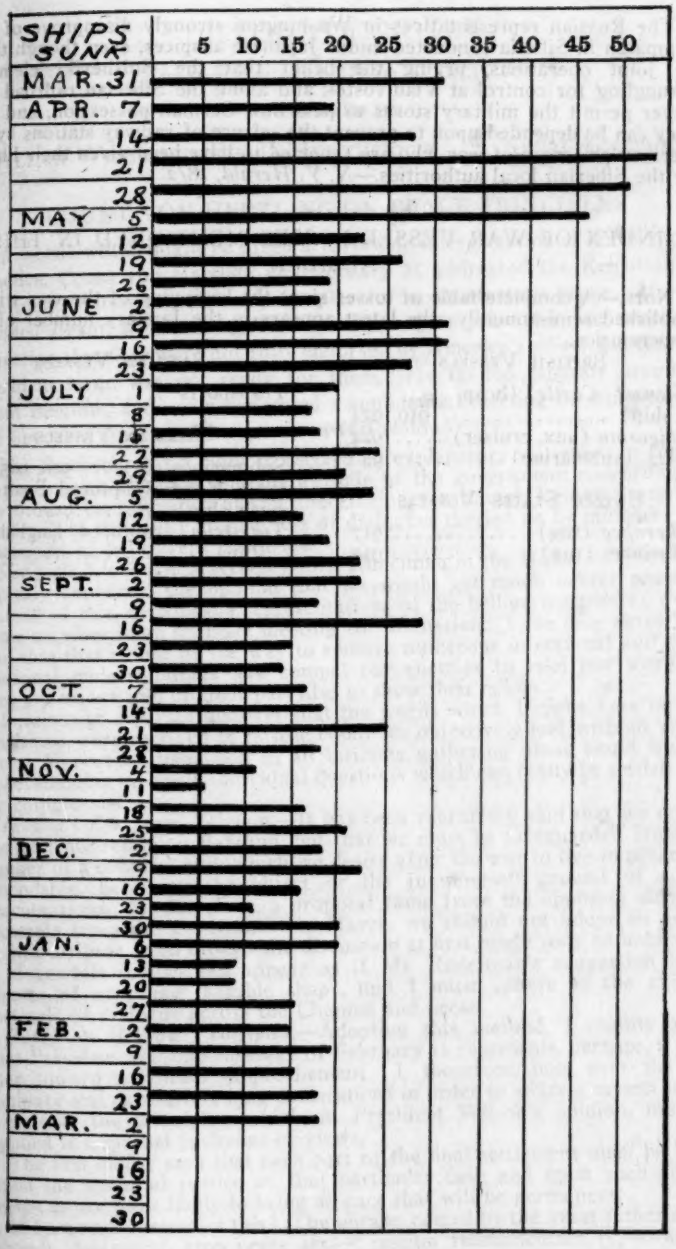
Accumulated at Vladivostok are military supplies of all kinds, much of American manufacture, and even greater quantities of Japanese origin, which were delivered long before the Bolsheviki took possession of the Russian Government. The Stevens commission of American engineers made extraordinary efforts to improve the facilities of the Siberian Railroad, so that these stores could be transported westward for the use of the Russian Army on the German and Austrian fronts. A good deal of accumulation was removed, but great quantities remain on the piers and in warehouses, and even in the open, both at Vladivostok and at points westerly on the railroad.

The material suffers greatly from deterioration through exposure to the weather and from other causes, but the principal matter of concern to the Allies is the danger that the stores shall fall into the hands of the Germans, who may make their delivery one of the conditions of any peace treaty which they are about to compel the Bolsheviki to sign.

This situation is regarded by the Japanese as warranting the adoption of some measures to secure these stores even if this involves military action on their part. They are quite willing to have the cooperation of the Entente forces and of American troops and sailors in this object, and the problem which is now occupying belligerent chancelleries is whether Japan shall be allowed to proceed single handed if a campaign in this quarter is begun or whether there shall be joint operations. Looking to the future, it has been argued that there should be a combination movement to avoid any such question as to the ultimate disposition of occupied territory in Siberia as might follow the exclusive entry of any one country.

From the tone of the discussion of this subject in official Washington it appears that while the Entente governments incline favorably to a joint campaign with Japan in Siberia they are faced with the obstacle that practically none of them has troops or ships available for an Asiatic campaign. This statement does not apply, however, to America, which not only has some powerful cruisers, with large crews and marine contingents, now in Asiatic waters, but in addition has about 20,000 troops in the Philippines and two full battalions, about 900 strong, in China, and on the railroad from where they could be sent quickly into Siberia.

While the whole American force would be insignificant compared to Japan's great naval and military resources at the scene, the participation of the American troops in the campaign would serve to maintain its international character.



ENGLISH MERCHANT SINKINGS

The Russian representatives in Washington strongly disapprove of any campaign in Siberia conducted under Japanese auspices, even though there be joint operations, urging the belief that the Bolsheviki elements struggling for control at Vladivostok and along the Siberian railroad will never permit the military stores to pass into German possession, and that they can be depended upon to prevent the seizure of railway stations by the German prisoners of war who are reported to have been given their liberty by the Siberian local authorities.—*N. Y. Herald*, 28/2.

INDEX OF WAR VESSEL LOSSES MENTIONED IN THIS NUMBER

NOTE.—A complete table of losses since the beginning of the war will be published semi-annually; the latest appears in the January number of the PROCEEDINGS.

BRITISH VESSELS

Glenart Castle (hosp. ship) 919, 924
Calgarian (aux. cruiser) 924
E-14 (submarine) 930

UNITED STATES VESSELS

Cherokee (tug) 917
Mariner (tug) 917

RUSSIAN VESSELS

Transports 926

GERMAN VESSELS

Submarines 920, 925, 927
Igotz Mendi (captured Spanish ship) 926
Turritella (captured English ship) 931

DIPLOMATIC NOTES

FROM FEBRUARY 18 TO MARCH 18

PREPARED BY

ALLAN WESTCOTT, PH. D., Instructor, U. S. Naval Academy

COUNT VON HERTLING ON PEACE PRINCIPLES

In words which might be given a favorable interpretation if borne out in practice, Count von Hertling on February 25 addressed the Reichstag on President Wilson's essential principles for a satisfactory peace. He expressed assent, with certain reservations, to these principles, but raised the objection that they were not fully endorsed by America's allies, and that the world at large was not ready for them. He invited separate proposals from Belgium, and again suggested a confidential meeting of diplomats of the opposing powers. The speech in full follows:

The Reichstag has a right to receive an explanatory statement in regard to the foreign situation and the attitude of the government concerning it. I will meet the obligation arising therefrom, even though I entertain certain doubts as to the utility and success of dialogues carried on by ministers and statesmen of belligerent countries.

Suggests "Intimate Meeting."—Mr. Runciman in the House of Commons recently expressed the opinion that we would get much nearer peace if, instead of this, responsible representatives of the belligerent powers would come together in an intimate meeting for discussion. I can only agree with him that that would be the way to remove numerous intentional and unintentional understandings and compel our enemies to take our words as they are meant, and on their part also to show their colors.

I cannot at any rate discover that the words which I spoke here on two occasions were received in hostile countries objectively and without prejudice. Moreover, discussion in an intimate gathering alone could lead to understanding on many individual questions which can really be settled only by compromise.

Invites Offer from Belgium.—It has been repeatedly said that we do not contemplate retaining Belgium, but that we must be safeguarded from the danger of a country, with which we desire after the war to live in peace and friendship, becoming the object or the jumping-off ground of enemy machinations. If, therefore, a proposal came from the opposing side, for example from the government in Havre, we should not adopt an antagonistic attitude, even though the discussion at first might only be unbinding.

Meanwhile it does not appear as if Mr. Runciman's suggestion has a chance of assuming tangible shape, and I must adhere to the existing methods of dialogue across the Channel and ocean.

Reply on Wilson Principles.—Adopting this method, I readily admit that President Wilson's message of February 11 represents, perhaps, a small step toward a mutual rapprochement. I, therefore, pass over the preliminary and excessively long declarations in order to address myself immediately to the principles, which, in President Wilson's opinion, must be applied in a mutual exchange of views.

The first clause says that each part of the final settlement must be based upon the essential justice of that particular case and upon such adjustments as are most likely to bring a peace that will be permanent.

Who would contradict this? The phrase, coined by the great father of the church, Augustine, 1500 years ago—"justitia fundamentum regnorum"—

is still valid to-day. Certain it is that only peace based in all its parts on the principles of justice has a prospect of endurance.

The second clause expresses the desire that peoples and provinces shall not be bartered about from sovereignty to sovereignty as if they were mere chattels and pawns in a game, even the great game, now forever discredited, of the balance of power.

This clause, too, can be unconditionally assented to. Indeed, one wonders that the President of the United States considered it necessary to emphasize it anew. This clause contains a polemic against conditions long vanished, views against cabinet politics and cabinet wars, against mixing state territory and princely and private property, which belong to a past that is far behind us.

Suggests Illusion by President.—I do not want to be discourteous, but when one remembers the earlier utterances of President Wilson, one might think that he is laboring under the illusion that there exists in Germany an antagonism between an autocratic government and a mass of people without rights.

And yet President Wilson knows (as, at any rate, the German edition of his book on the state proves) German political literature, and he knows, therefore, that with us princes and governments are the highest members of the nation as a whole, organized in the form of a state, the highest members, with whom the final decision lies. But, seeing that they also, as the supreme organs, belong to the whole, the decision is of such a nature that only the welfare of the whole is the guiding line for a decision to be taken. It may be useful to point this out expressly to President Wilson's countrymen.

Then finally at the close of the second clause the game of the balance of power is declared to be forever discredited. We, too, can only gladly applaud. As is well known, it was England which invented the principle of the maintenance of the balance of power in order especially to apply it when one of the states on the European continent threatened to become too powerful for her. It was only another expression for England's domination.

The third clause, according to which every territorial settlement involved in this war must be made in the interest and for the benefit of the populations concerned, and not as a part of any mere adjustment or compromise of claims among rival states, is the only application of the foregoing in a definite direction, or a deduction from it, and is therefore included in the assent given to that clause.

Now, in the fourth clause he demands that all well-defined national aspirations shall be accorded the utmost satisfaction that can be accorded them without introducing new or perpetuating old elements of discord and antagonism that would be likely in time to break the peace of Europe, and consequently of the world. Here, also, I can give assent in principle, and I believe, therefore, with President Wilson, that a general peace of such a basis is discussable.

Wilson "in Advance of Realities."—Only one reservation is to be made. These principles must not be proposed by the President of the United States alone, but they must also be recognized definitely by all states and nations. President Wilson, who reproaches the German Chancellor with a certain amount of backwardness, seems to me in his flight of ideas to have hurried far in advance of existing realities.

Certainly a League of Nations, erected upon justice and mutual unselfish appreciation, a condition of humanity in which war, together with all that remains of the earliest barbarism, should have completely disappeared and in which there should be no bloody sacrifices, no self-mutilation of peoples, no destruction of laboriously acquired cultural values—that would be an aim devoutly to be desired.

But that aim has not yet been reached. There does not yet exist a court of arbitration set up by all nations for the safeguarding of peace in the name of justice. When President Wilson incidentally says that the German

Chancellor is speaking to the court of the entire world, I must, as things stand to-day, in the name of the German Empire and her allies, decline this court as prejudiced, joyfully as I would greet it, if an impartial court of arbitration existed and gladly as I would cooperate to realize such ideals.

Unfortunately, however, there is no trace of a similar state of mind on the part of the leading powers in the Entente. England's war aims, as recently expressed in Lloyd George's speeches, are still thoroughly imperialistic and want to impose on the world a peace according to England's good pleasure. When England talks about peoples' right of self-determination, she does not think of applying the principle to Ireland, Egypt, or India.

Rejects Conquest Aim in Russia.—Declaring that the new German operations against Russia were taken at the request of the populations to restore order, and that they did not aim at conquest, the Chancellor continued:

Our war aims from the beginning were the defence of the Fatherland, the maintenance of our territorial integrity, and the freedom of our economic development. Our warfare, even where it must be aggressive in action, is defensive in aim. I lay especial stress upon that just now in order that no misunderstandings shall arise about our operation in the east.

After the breaking off of peace negotiations by the Russian delegation on February 10, we had a free hand as against Russia. The sole aim of the advance of our troops, which was begun seven days after the rupture, was to safeguard the fruits of our peace with Ukraine. Aims of conquest were in no way a determining factor. We were strengthened in this by the Ukrainians' appeal for support in bringing about order in their young state against the disturbances carried out by the Bolsheviki.

If further military operations in other regions have taken place, the same applies to them. They in no way aim at conquest. They are solely taking place at the urgent appeals and representations of the populations for protection against atrocities and devastation by red guards and other hands. They have, therefore, been undertaken in the name of humanity. They are measures of assistance, and have no other character. It is a question of creating peace and order in the interest of peaceable populations.

We do not intend to establish ourselves, for example, in Esthonia or Livonia. In Courland and Lithuania our chief object is to create organs of self-determination and self-administration. Our military action, however, has produced a success far exceeding the original aim.

News was received yesterday that Petrograd had accepted our conditions and had sent its representatives to Brest-Litovsk for further negotiations. Accordingly, our delegates traveled thither last evening. It is possible that there will still be dispute about the details, but the main thing has been achieved. The will to peace has been expressly announced from the Russian side, while the conditions have been accepted and the conclusion of peace must ensue within a very short time.

To safeguard the fruits of our peace with Ukraine, our army command drew the sword. Peace with Russia will be the happy result.

With regard to Rumania, too, the guiding principle will be that we must, and desired to, convert into friends the states with which on the basis of the success of our army we now conclude peace.

Peace negotiations with Rumania began at Bucharest yesterday. It appeared necessary that Secretary von Kühumann should be present there during the first days when the foundations were laid. Now, however, he will presumably soon go to Brest-Litovsk. It is to be remembered regarding negotiations with Rumania that we are not taking part in them alone, and are under obligation to champion the interests of our allies, Austria-Hungary, Bulgaria, and Turkey, and to see to it that a compromise is arranged there regarding any divergent desires that will possibly give rise to difficulties, but these difficulties will be overcome.

I will say a word regarding Poland, in behalf of whom the Entente and President Wilson have recently appeared specially to interest themselves, as a well-known country liberated from oppressive dependence on Czarist

Russia by the united forces of Germany and Austria-Hungary, for the purpose of establishing an independent state, which, in unrestricted development of its national culture, shall at the same time become a pillar of peace in Europe.

The constitutional problem—in the narrower sense the question what constitution the new state shall receive—could not, as is easily understood, be immediately decided, and is still in the stage of exhaustive discussions between the three countries concerned. A fresh difficulty has been added to the many difficulties which have in this connection to be overcome, difficulties especially in the economic domain in consequence of the collapse of old Russia. This difficulty results from the delimitation of the frontier between the new state and adjacent Russian territory. For this reason the news of peace with the Ukraine at first evoked great uneasiness in Poland. I hope, however, that with good-will and proper regard to the ethnographical conditions a compromise on the claims will be reached. The announced intention to make a serious attempt in this direction has greatly calmed Polish circles.

In the regulation of the frontier question only what is indispensable on military grounds will be demanded on Germany's part.

The Entente are fighting for the acquisition of portions of Austro-Hungarian territory by Italy and for the severance of Palestine, Syria, and Arabia from the Turkish Empire. England hopes by the creation of a dependent protectorate to annex new portions of territory to the British Empire and to increase and round off the British possessions, especially in Africa.

In the face of this policy Entente statesmen dare to represent Germany as the disturber of peace, who, in the interest of world peace, must be confined within the narrowest bounds. By a system of lies and calumny they endeavor to instigate their own people and neutral countries with the spectre of the violation of neutrality by Germany.

Regarding the intrigues recently carried on in Switzerland we never thought, nor will we think, of assailing Swiss neutrality. We are much indebted to Switzerland. We express gratitude to her, Holland, the Scandinavian countries and Spain, which by her geographical position is exposed to especial difficulties, and no less to the extra-European countries which have not entered the war, for their manly attitude in that, despite all temptations and oppressions, they preserve their neutrality.

The world is longing for peace, but the governments of the enemy countries are again inflaming the passion for war. There are, however, other voices to be heard in England; it is to be hoped that these voices will multiply.

The world yearns for peace and desires nothing more than that the sufferings of war under which it groans should come to an end. But the governments of the enemy states contrive ever anew to stir up the war fury among their peoples. A continuation of the war to utmost was, so far as has transpired, the most recent watchword issued by the Conference of Versailles, and in the English Premier's speeches it again finds loud echo. There are, however, other voices to be heard in England; it is to be hoped that these voices will multiply.

Our people will hold out further, but the blood of the fallen, the agonies of the mutilated and the distress and sufferings of the peoples will fall on the heads of those who insistently refuse to listen to the voice of reason and humanity.

SPEECH ONLY A "POLITICAL GAME."—The Hague, March 1.—The annexationist *Weser Zeitung*, commenting on von Hertling's speech, remarks that the Chancellor's words indicate descending one step of the ladder of the old Bethmann-Hollweg policy, but expresses the hope that as the situation of Germany at present is much more favorable, Hertling's formula may be

considered as merely a political means and not as an expression of the whole nation.

"If if were otherwise," says the paper, "the Chancellor would have to count on opposition from the best and truest, as he seems to have forgotten his words about the continuation of the fight."

The paper says that the Chancellor does not mention the dangers of invasion nor the question of indemnities for "countless sacrifices," nor the settlement of evacuated territories with German inhabitants, but argues that this defensive speech is probably only a political game like Wilson's peace talk. It asserts that this policy is certainly not dangerous in the east, but holds that the Chancellor's speech creates uncertainty as to the west, as by declaring a lack of intention of annexing Belgium he releases a valuable pawn. The paper holds that, everything considered, it is questionable whether Hertling brought peace any nearer.

"The Chancellor," it says, "approves Wilson's four points merely to play them against other members of the Entente."

The Zeitung concludes that only by the use of the sword in the east and the west will peace willingness be created, and that talk is useless in view of the big offensive expected in the west.—*N. Y. Times, 2/3.*

BALFOUR SEES NO PEACE BASIS.—London, February 27.—Foreign Secretary Balfour, replying in the House of Commons to the speech of Count von Hertling, regarding the doctrine of the balance of power, said that until German militarism had become a thing of the past, and there was in existence a hall or court armed with executive powers making the weak as safe as the strong, it would never be possible to ignore the principles underlying the struggle for the balance of power.

Mr. Balfour told the House that he was unable to find in von Hertling's speech any basis for fruitful conversation or hope for peace. The Chancellor's attitude concerning Belgium, said Mr. Balfour, was completely unsatisfactory, and his lip service to President Wilson's proposition was not exemplified in German practice.

Belgium the Touchstone.—Mr. Balfour declared Count Hertling's reference to Belgium to be unsatisfactory to everybody—except Richard Holt, a Radical M. P.—and continued:

"Many questions must be settled at the peace conference, but the question of Belgium is the best touchstone of the honesty of purpose of Central European diplomacy, and especially of German diplomacy. There is only one course for the offending nation in this case, namely, unconditional restoration and reparation.

"When was Belgium the jumping off ground of enemy machinations and why should Germany suppose it is going to be? Belgium has been the victim, not the author, of these crimes, and why should she be punished because Germany is guilty? Germany always had in mind new territorial, commercial or military conditions which would prevent Belgium from taking an independent place among the nations, which Germany and ourselves were pledged to preserve.

"What we have to consider is how far von Hertling's lip service to President Wilson's four propositions really is exemplified by German practice."

The Foreign Secretary then analyzed the four Wilson propositions and von Hertling's attitude concerning them, as well as the Chancellor's frame of mind regarding Alsace-Lorraine. He said:

"I could understand a German taking a different view from the view of the French, British, Italian, or American Government, but not a German discussing the principles of essential justice and saying: 'There is no question of Alsace-Lorraine to go before a peace conference.'

"Regarding President Wilson's second proposition, we have had within the last few weeks a specimen of how von Hertling interprets in action the principle he so glibly approves in theory. To take one instance only, there

is the cession of Polish territory to the Ukraine. We would like to know how the Germans came to make this gross violation of their principle.

Turkey and Palestine.—"Coming to the third proposition, von Hertling says, with justice, that the doctrine of the balance of power is a more or less antiquated doctrine. He further accuses England of being the upholder of that doctrine for purposes of aggrandizement. That is a profoundly unhistorical method of looking at the question. Great Britain has fought time and again for the balance of power, because only by fighting could Europe be saved from the domination of one overbearing and aggressive nation.

"If von Hertling wants to make the balance of power antiquated, he can do it by inducing his countrymen to abandon that policy of ambitious domination which overshadows the world at this moment.

"As to President Wilson's third and fourth principles: Consider for a moment how von Hertling desires to apply the principle that the interest and benefit of the populations concerned should be considered in peace arrangements. He mentions three countries he wishes to see restored to Turkey, namely, Armenia, Palestine, and Mesopotamia.

"Does any one think that this would be to the interest and benefit of the populations concerned? Von Hertling accuses us of being animated with purely ambitious designs when we invaded Mesopotamia and captured Jerusalem. I suppose he would say that Russia was similarly moved when she occupied Armenia. But when Turkey went to war she picked a quarrel with us for purely ambitious purposes. She was promised by Germany the possession of Egypt. Would the interest and happiness of the population of Egypt be best conserved by Turkish conquest of Egypt?

"The Germans in the search for the greatest happiness of these populations would have restored Egypt to the worst rule the world has ever known. They would have destroyed Arab independence and abandoned Palestine to those who had rendered it sterile all these centuries.

"How could any one preach seriously a profession of faith about the interests of populations after this evidence of the manner in which von Hertling desired to see it carried out? If the Reichstag had any sense of humor it must surely have smiled when it heard the Chancellor dealing in that spirit with the dominating doctrine of every important German statesman, soldier, and thinker for two generations at least.

"So much for the four principles which Mr. Holt says von Hertling accepts, and which he thinks the British Government is backward in not accepting. I hope my short analysis may have convinced him that there are two sides to that question."—*N. Y. Times Current History,* April.

Lord Robert Cecil, Minister of Blockade, referring to the von Hertling speech, said:

"It would be foolish to enter into negotiations unless there were a reasonable prospect of success. We do not desire to repeat the experiment of the Brest-Litovsk negotiations."—*N. Y. Times,* 28/2.

RUSSIA MAKES PEACE WITH CENTRAL POWERS

Following Trotzky's abandonment of negotiations at Brest-Litovsk in January, and immediately upon the expiration of the armistice on February 18, German forces crossed the Dvina River and advanced toward Petrograd, capturing the port of Reval and occupying the Russian Baltic provinces not already under their control. At the same time both Germany and Austria sent troops to assist the bourgeois government of Ukraine in driving out the Bolsheviki, and announced on March 2 the "liberation" of Kief.

On February 19, Lenine and Trotzky despatched a wireless message of capitulation in the following terms:

The Council of Peoples' Commissaries protests against the fact that the German Government has directed its troops against the Russian Councils' republic which has declared the war was at an end and which is demobilizing its army on all fronts.

The Workmen's and Peasants' Government of Russia could not anticipate such a step because neither directly nor indirectly has any one of the parties which concluded the armistice given the seven days' notice required in accordance with the treaty of December 15 for terminating it.

The Council of People's Commissaries in the present circumstances regards itself as forced formally to declare its willingness to sign a peace upon the condition which had been dictated by the delegations of the Quadruple Alliance at Brest-Litovsk.

The Council of People's Commissaries further declares that a detailed reply will be given without delay to the conditions of peace as proposed by the German Government.

(Signed) FOR THE COUNCIL OF PEOPLE'S COMMISSARIES:
LENINE,
TROTZKY.

This was followed, on request from General Hoffman in command of the German forces, by a messenger bearing a copy of the message with Lenine's and Trotzky's signatures.

The German advance, however, continued, encountering little active resistance, in spite of a series of proclamations from the Lenine Government, on February 21 and later, calling for "war to the death." According to approximate estimates, the captures included 6800 officers, 57,000 men, 2400 guns, 5000 machine guns, and large quantities of munitions and railroad supplies. The advance extended at one point to Jamburg, on the Reval-Petrograd line 68 miles from the capital. It did not stop till the peace treaty was signed.

On February 23, Germany again laid down her terms to Russia, to which the Petrograd council agreed. A Russian delegation went to Brest-Litovsk and without effort to debate signed the treaty on March 3, subject to ratification by the All-Russian Congress of Councils of Workmen's, Peasants', and Cossacks' Delegates within two weeks. The German terms were, in brief, as follows:

By this treaty Russia is forced to accede to the ultimatum of the Central Powers made on February 21, and in addition must cede to Turkey lands taken from her in the wars of 1828-9, 1854-5, 1877-8, and in the present war. The terms in detail include the following provisions:

(1) The surrender of Courland, Poland, and Lithuania, except part of the Province of Grodno, and Russia's renunciation of every claim to intervention in the internal affairs of these regions.

(2) The evacuation of Livonia and Esthonia, these provinces to be policed by Germany until "the constitution of the respective countries shall guarantee their social security and political order."

(3) Russia to conclude peace with the Ukraine.

(4) Russian troops and Red Guards to evacuate the Ukraine and Finland.

(5) Immediate and complete demobilization of the Russian Army.

(6) Russian warships to be disarmed or kept in Russian harbors until the conclusion of peace; warships of the Entente in Russian waters to be treated likewise.

(7) Merchant navigation of the Black and Baltic seas to be renewed, mines to be cleared away promptly, the blockade of the Arctic Ocean to remain in force until a general peace.

(8) Free export of ores without tariff from Russia and other wide commercial concessions.

(9) Russia to promise not to attempt Bolshevik propaganda in Teuton territory.

An indemnity variously reported at $1,500,000,000 and $4,000,000,000 was added.—*N. Y. Nation*, 7/3.

TEXT OF TREATY

Article 1.—The Central Powers and Russia declare the state of war between them to be terminated, and are resolved henceforth to live in peace and friendship with one another.

Article 2.—The contracting nations will refrain from all agitation or provocation against other signatory governments and undertake to spare the populations of the regions occupied by the powers of the quadruple entente.

Article 3.—The regions lying west of the line agreed upon by the contracting parties, an formerly belonging to Russia, shall no longer be under Russian sovereignty. It is agreed that the line appears from the appended map, No. 1, which, as agreed upon, forms an essential part of the peace treaty. The fixing of the line in the west will be settled in the German-Russian mixed commission. The regions in question will have no obligation whatever toward Russia arising from their former relations thereto. Russia undertakes to refrain from all interference in the internal affairs of these territories and to let Germany and Austria determine the future fate of these territories in agreement with their populations.

Article 4.—Germany and Austria agree, when a general peace is concluded and Russian demobilization is fully completed, to evacuate the regions east of the line designated in Article 3, No. 1, in so far as Article 6 does not stipulate otherwise. Russia will do everything in her power to complete as soon as possible the evacuation of the Anatolian provinces and their orderly return to Turkey. The districts of Erivan, Kars, and Batum will likewise without delay be evacuated by the Russian troops. Russia will not interfere in the reorganization of the constitutional or international conditions of these districts, but leave it to the populations of the districts to carry out the reorganization in agreement with the neighboring states, particularly Turkey.

Article 5.—Russia will without delay carry out the complete demobilization of her army, including the forces newly formed by the present government. Russia will further transfer her warships to Russian harbors and leave them there until a general peace or immediately disarm. Warships of states continuing in a state of war with the quadruple alliance will be treated as Russian warships in so far as they are within Russian control.

The barred zone in the Arctic continues in force until the conclusion of peace. An immediate beginning will be made of the removal of mines in the Baltic and in so far as Russian power extends in the Black Sea. Commercial shipping is free in these waters and will be resumed immediately. A mixed commission will be appointed to fix further regulations, especially for the announcement of routes for merchant ships. Shipping routes are to be kept permanently free from floating mines.

Article 6.—Russia undertakes immediately to conclude peace with the Ukrainian People's Republic and to recognize the peace treaty between this state and the powers of the quadruple alliance. Ukrainian territory will be immediately evacuated by the Russian troops and the Russian Red Guard. Russia will cease all agitation or propaganda against the government or the public institutions of the Ukrainian People's Republic.

Esthonia and Livonia will likewise be evacuated without delay by the Russian troops and the Russian Red Guard.

The eastern frontier of Esthonia follows in general the line of the Narova River. The eastern frontier of Livonia runs in general through Peipus Lake and Pskov Lake to the southeasterly corner of the latter, then over Lubahner (Luban) Lake in the direction of Lievenhof, on the Dvina.

Esthonia and Livonia will be occupied by a German police force until security is guaranteed by their own national institutions and order in the state is restored. Russia will forthwith release all arrested or deported inhabitants of Esthonia and Livonia and guarantee the safe return of deported Esthonians and Livonians.

Finland and the Aland Islands will also forthwith be evacuated by the Russian troops and the Red Guard, and Finnish ports by the Russian fleet and Russian naval forces.

So long as the ice excludes the bringing of Russian warships to Prussian ports only small detachments will remain behind on the warships. Russia is to cease all agitation or propaganda against the government or the public institutions in Finland.

The fortifications erected on the Aland Islands are to be removed with all possible dispatch. A special agreement is to be made between Germany, Russia, Finland, and Sweden regarding the permanent non-fortification of these islands, as well as regarding their treatment in military, shipping, and technical respects. It is agreed that at Germany's desire the other states bordering on the Baltic are also to be given a voice in the matter.

Article 7.—Starting from the fact that Persia and Afghanistan are free and independent states, the contracting parties undertake to respect their political and economic independence and territorial integrity.

Article 8.—Prisoners of war of both sides will be sent home.

Article 9.—The contracting parties mutually renounce indemnification of their war costs—that is to say, state expenditure for carrying on the war, as well as indemnification for war damages—that is to say, those damages which have arisen for them and their subjects in the war regions through military measures, inclusive of all requisitions undertaken in the enemy country.

Article 10.—Diplomatic and consular relations between the contracting parties will be resumed immediately after notification of the peace treaty. Special agreements are reserved relative to the admittance of the respective consuls.

Article 11.—The prescriptions contained in Appendices 2 to 5 shall govern the economic relations between the powers of the quadruple alliance and Russia—namely, Appendix 2 for German-Russian, Appendix 3 for Austro-Hungarian-Russian, Appendix 4 for Bulgarian-Russian, and Appendix 5 for Turkish-Russian relations.

Article 12.—The restoration of public and private relations, the exchange of prisoners of war, interned civilians, the amnesty question, as well as the treatment of merchant ships which are in enemy hands will be regulated by separate treaties with Russia, which shall form an essential part of the present peace treaty, and as far as is feasible shall enter into force at the same time.

Article 13.—For the interpretation of this treaty the German and Russian text is authoritative for the relations between Germany and Russia; for the relations between Austria-Hungary and Russia, the German, Hungarian, and Russian text; for the relations between Bulgaria and Russia, the Bulgarian-Russian text; for the relations between Turkey and Russia, the Turkish and Russian text.

Article 14.—The present peace treaty will be ratified. Instruments of ratification must be exchanged as soon as possible in Berlin. The Russian Government undertakes at the desire of one of the quadruple alliance powers to exchange ratifications within two weeks. The peace treaty enters into force on its ratification, in so far as its articles, appendices, or supplementary treaties do not prescribe otherwise.—*N. Y. Times Current History*, April.

EMPEROR WILLIAM'S CONGRATULATIONS.—Emperor William, according to another official announcement, has sent a telegram to Count von Hertling, the German Imperial Chancellor, reading as follows:

"The German sword, wielded by great army leaders, has brought peace with Russia. With deep gratitude to God, who has been with us, I am filled with proud joy at the deeds of my army and the tenacious perseverance of my people. It is of especial satisfaction to me that German blood and German Kultur have been saved. Accept my warmest thanks for your faithful and strong cooperation in the great work."—*N. Y. Times*, 5/3.

PRESIDENT WILSON TO RUSSIAN CONGRESS.—On March 11, President Wilson addressed a message of friendship and encouragement to the All-Russian Congress about to assemble at Moscow. This message was regarded as expressing the feeling of the United States Government that the Allies should not abandon Russia and the assurance that Russia might depend on the consistent friendship of this country. The text follows:

WASHINGTON, March 11.

"May I not take advantage of the meeting of the Congress of the Soviets to express the sincere sympathy which the people of the United States feel for the Russian people at this moment when the German power has been thrust in to interrupt and turn back the whole struggle for freedom and substitute the wishes of Germany for the purpose of the people of Russia?

"Although the government of the United States is, unhappily, not now in a position to render the direct and effective aid it would wish to render, I beg to assure the people of Russia through the congress that it will avail itself of every opportunity to secure for Russia once more complete sovereignty and independence in her own affairs and full restoration to her great rôle in the life of Europe and the modern world.

"The whole heart of the people of the United States is with the people of Russia in the attempt to free themselves forever from autocratic government and become the masters of their own life."

(Signed) WOODROW WILSON.

The message was telegraphed to the American Consul General at Moscow for delivery to the congress.

This message was received favorably by the Russian Congress and on March 14 was answered in characteristic fashion as follows:

The All-Russian Congress of Soviets expresses its appreciation to the American people and, first of all, the laboring and exploited classes in the United States for the message sent by President Wilson to the Congress of Soviets, in this time when the Russian Socialist Soviet Republic is living through most difficult trials.

The Russian Republic uses the occasion of the message from President Wilson to express to all peoples who are dying and suffering from the horrors of this imperialistic war its warm sympathy and firm conviction that the happy time is near when the laboring masses in all bourgeois countries will throw off the capitalist yoke and establish a Socialist state of society, which is the only one capable of assuring a permanent and just peace as well as the culture and well-being of all who toil.

SOVIET CONGRESS RATIFIES PEACE.—The All-Russian Congress of Soviets, meeting at Moscow on March 14, ratified by a vote of 453 to 30 the peace treaty with the Central Powers. Only slightly more than half the delegates expected to attend the Congress were reported as voting. The Congress adjourned on March 16, after passing a resolution for organizing the defence of the country by creating a national army of both sexes.

The independent government established in the Caucasus at the same time issued a statement refusing to surrender Kars, Batoum, and Ardahan to Turkey, as provided in the Brest-Litovsk Treaty, and stating that the Caucasus had sent delegates to negotiate with Turkey at Trebizond.

THE BOLSHEVIK DILEMMA.—Petrograd, March 11.—Premier Lenine and the other People's Commissaries left for Moscow last night. Petrograd is to be governed by a special committee headed by Zinoviev and nominated by the Petrograd Soviet. The work of this committee will be to maintain order and defend the approaches to Petrograd. The president of the military organization is Leon Trotzky, who had resigned his post as Commissary for Foreign Affairs, and will not attend the Moscow Congress.

The peace party headed by Lenine, now, obviously, has got the upper hand. Not, I imagine because any one, even among the most infatuated Bolsheviki, regards peace as tolerable or in the least degree final, but because a continuation of hostilities against the Germans at the present moment would be suicidal for the Bolshevist Government. They could not seriously fight. They would have to beat a precipitate retreat, with the certainty of being compelled ultimately to submit to a still more humiliating and destructive peace.

So far Lenine's logic is absolutely convincing. His argument from a contrast between the first and second Brest-Litovsk Conference is irrefutable, but then the position after peace is concluded will be hardly less difficult. Every clause of the peace treaty bristles with danger for the Bolsheviki. Lenine talks of a breathing space, and has outlined a program of further communist reforms to be put into execution when the war finally stops. But the execution of this program is incompatible with the practical fulfillment of the peace treaty. The financial and economic obligations imposed by Germany on Russia simply cannot be carried out under the present communal régime. Conflicts are inevitable as soon as the Germans come in and begin trading with Russia.

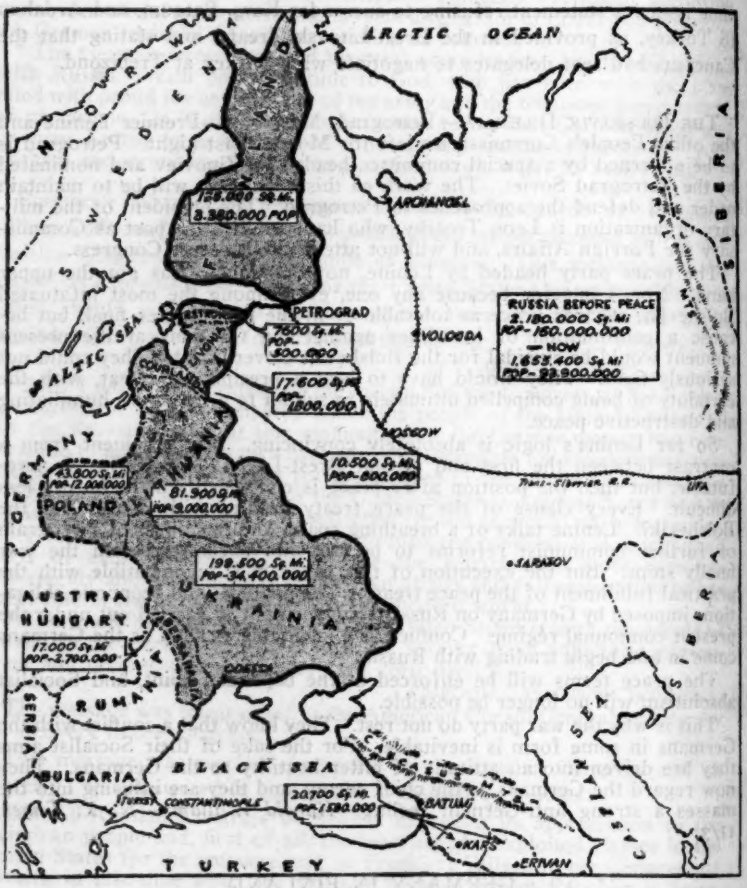
The peace terms will be enforced at the bayonet's point, and Socialist absolutism will no longer be possible.

This is why the war party do not rest. They know that a conflict with the Germans in some form is inevitable. For the sake of their Socialist aims they are driven into an attitude of bitter hostility to the Germans. They now regard the Germans as the chief enemy, and they are infusing into the masses a strong anti-German feeling.—*Harold Williams.—N. Y. Times*, 11/3.

GERMANY IN FINLAND

GERMANY OCCUPIES ALAND ISLANDS.—On February 24, it was announced from Stockholm that Sweden had sent 500 troops to maintain order in the Aland Islands, which control the entrance to the Gulf of Bothnia. Professor Eden, the Swedish Premier, stated that the measure was only temporary, and was in accordance with an agreement between the warring "Red" and "White Guard" factions in the islands.

That Sweden's move was merely temporary was shown by the news, on March 4, that German forces had seized the islands, as a preliminary move to the despatch of troops to Finland. Sweden, according to this despatch, protested against the Aland Islands being placed in the war zone; and her vital interest in the islands, together with the presence of her troops there, suggested the possibility of friction with Germany.



HOW THE GERMANS ARE CARVING UP RUSSIA

The German Government has already arranged for the severance in some form of Russian territory of 524,600 square miles with a population of 66,100,000. Various excuses and explanations of this work are given. Some provinces are to "self-determine" their own form of government. Others are to be given outright to the "Ukraine People's Republic," and Rumania has been notified that in consideration of signing a peace treaty she may give up the mouth of the Danube to Bulgaria and take Bessarabia from Russia. About one-fourth the total area of Russia, containing more than one-third the population, is thus taken from her. Should Germany succeed in her project these states in some form or other will, of course, be suzerainties of the Fatherland.—*Baltimore Star*, 1/3.

GERMANY AND SWEDEN.—London, March 10.—Germany's dealings with Finland thus far seem to be designed to make Finland a minor German kingdom, with the Emperor's son, Prince Oscar, on the throne, and to make another Heligoland of the Aland Islands. This scheme is a direct blow against Sweden, and, in a less degree, against Denmark and Norway, and is in line with the German Emperor's boast that the Baltic lands have been made permanently German.

The Aland Islands, geographically, are as much a part of Sweden as Newfoundland is of Canada. Throughout the war Sweden has been troubled by the fear that Russia would take them. Germany now occupies the islands temporarily, but the German flag flies over the public buildings, and no one believes that it will ever come down except by force.

The most practical effect of German control of Finland and the Aland Islands is pointed out by Reventlow, who says that they will no longer be used as a commercial bridge between Scandinavia and Russia. This is a bar to American as well as British trade with Russia.

That the Scandinavian countries have been overfriendly to the Entente came here as an amusing charge. Sweden has been generally rated the most pro-German of the neutral European nations, except possibly Spain. The royal family, the aristocracy, the universities, and the army have been outspokenly pro-German.

For a long time it was feared that Sweden would join the Germanic alliance. According to one newspaper, 55 per cent of the steel Germany has used for munitions has been furnished by Sweden.

Denmark has never been considered overfriendly to the Entente, but considering the fact that she is a small nation living under the muzzles of the German guns and with the mailed fist at her throat, the fact that she is leaning backward in maintaining her neutrality toward the Entente countries is understood to have caused no ill-feeling.

The latest German move appears to be a familiar one. Germany feels that she is now in a position where she is so strong in the north that she need no longer cultivate the friendship of the Scandinavian countries, and that she may make whatever damaging arrangements she desires and threaten them.

The *Cologne Gazette*, in commenting on the Swedish press editorials regarding the occupation of the Aland Islands, says:

"The Swedes have no cause for complaint. They reap simply the result of their policy of overprudence during the war."—*N. Y. Times*, 10/3.

GERMAN TREATY WITH FINLAND.—According to a London rumor of March 8, the Finnish Government had offered the throne of that country to Prince Oscar, fifth son of Emperor William. Prince Oscar is in his 30th year.

An Amsterdam despatch of March 7 stated that a treaty had been signed on March 7 between Germany and Finland containing the following terms:

"Article 1 declares that no state of war exists between Germany and Finland; that the contracting parties are resolved henceforth to live in peace and friendship, and that Germany will exert herself to secure recognition by all the powers of Finland's autonomy and independence. On the other hand, Finland will cede no portion of her territory to a foreign power nor grant such power any easement on territory over which she is sovereign without previously coming to an understanding with Germany on the subject."

The following articles relate to the resumption of diplomatic and consular relations immediately after the ratification of the peace treaty, renunciation by each party by compensation for war costs and indemnities, restoration of state treaties and private rights, exchange of prisoners of war and interned civilians, and compensation for civil damages.—*N. Y. Times*, 9/3.

RUMANIA FORCED TO PEACE WITH CENTRAL POWERS

Despatches of February 28 stated that Count Czernin had communicated to Rumania the peace terms offered by the Central Powers and had granted King Ferdinand a short time to consider them.

Negotiations were soon afterwards begun at Bufftea, near Bucharest, and a preliminary treaty was signed on March 5. This treaty forced Rumania to surrender the territory of Dobrudja including her Black Sea coast as far north as the Danube; to permit a "rectification" of her Austro-Hungarian frontier for "strategic reasons"; to demobilize her army, and to allow transport of troops of the Central Powers through her territories to Ukraine. The terms follow in summary form:

"I. Rumania cedes to the Central Allied Powers Dobrudja as far as the Danube.

"II. The powers of the Quadruple Alliance will provide and maintain a trade route for Rumania by way of Constanza to the Black Sea.

"III. The frontier rectifications demanded by Austria-Hungary on the frontier between Austria-Hungary and Rumania are accepted in principle by Rumania.

"IV. Economic measures corresponding to the situation are conceded in principle.

"V. The Rumanian Government undertakes to demobilize immediately at least eight divisions of the Rumanian Army. Control of the demobilization will be undertaken jointly by the upper command of Field Marshal von Mackensen's army group and the Rumanian chief army command. As soon as peace is restored between Russia and Rumania the remaining parts of the Rumanian Army also will be demobilized in so far as they are not required for security service on the Russo-Rumanian frontier.

"VI. The Rumanian troops are to evacuate immediately the territory of the Austro-Hungarian monarchy occupied by them.

"VII. The Rumanian Government undertakes to support with all its strength the transport of troops of the Central Powers through Moldavia and Bessarabia to Odessa.

"VIII. Rumania undertakes immediately to dismiss the officers of the powers who are at war with the Quadruple Alliance still in the Rumanian service. The safe conduct of these officers is assured by the Quadruple Alliance. This treaty enters into operation immediately."

GERMANY'S EASTERN OPENING.—The treaty with Rumania was received with joy in Germany and Austria, it being hailed as the "oil peace" while that with Ukraine was the "bread peace."

Among allied diplomats the terms forced on Rumania by Count Czernin were considered a sufficient commentary on his previous sentiments for a liberal peace. Interest centered rather in the possibilities opened to Germany by control of the Black Sea. With this route at her disposal, and control of the Trans-Caucasian railway surrendered by Russia to Turkey, Germany would have a road to India other than the Bagdad line, and might stir in Great Britain the same fears (largely groundless) that Russia caused in the past. Naturally, however, the difficulties of this route and the excentric character of an offensive along it, would make its usefulness to Germany entirely dependent on a successful issue in the west.

SPAIN

SPAIN GROWS PEEVISH.—The calm persistence with which Germany continues to violate the neutrality of Spain is at last beginning to react upon all except the most pro-German of the Spaniards. Within a month German submarines sank no less than six Spanish vessels in spite of vigorous protests made to Berlin. The Madrid *Imparcial* says: "The persistence of the submarines is exhausting our patience. We receive, in spite of the gratitude which is our due, the same treatment as an enemy power." Discussing the latest sinking, the *Liberal* writes in a tone of pained surprise: "We are confronted by another violation of international law. It is a criminal, brutal act, and deserves a virile protest from the whole country against the ingratitude and insults of Germany." The Madrid *Sol* is indignant that the press is so apathetic, and says:

"We know that any pro-German when asked about his feelings regarding the war usually protests that he is pro-Spanish. The pro-Germans have discovered in this love for Spain a convenient cushion on which to fall without hurting themselves, and claim a monopoly of solicitude for the dignity, honor, and interests of Spain. We awaited comments in the pro-German newspapers on the torpedoing of the *Giralda*, and found them merely interested in an entertainment at the German college attended by Prince Ratibor. Not a word about the outrage committed off Guardia by a German submarine against a Spanish coasting-vessel.

"In certain papers we can understand this attitúde. They must obey their masters. But it is not so intelligible in others which a few months ago were full of indignation at a similar attack on our mercantile marine. These papers, formerly so angered, dare not say a word to-day. The reason of this is plain enough to those who are in the secret.

"We are condemned, it seems, to find people who approve of the destruction of our ships and the killing of our sailors. But that is not all. On the Emperor of Germany's birthday some Madrid churches officially prayed for him. They have not yet prayed that the torpedoing may continue, but that may come."—*Literary Digest*, 16/3.

SPANISH AGREEMENT RATIFIED UNDER WHICH SUPPLIES MAY BE SENT TO PERSHING'S FORCES; ALSO PROVIDES FRENCH CREDIT.—*U. S. in Return to Give Spain a Limited Amount of Needed Goods, with Guarantee That They Will Not Be Reshipped to Germany.*—The war trade board authorizes the following:

The negotiations between the United States and Spain for the conclusion of a commercial agreement have been brought to a successful conclusion. The war trade board has received word from Ambassador Willard that ratifications of the new agreement, which had been delayed a few days on account of the changes in the Spanish cabinet, were interchanged in Madrid Thursday afternoon. The agreement takes immediate effect.

Of a Three-Sided Character.—These negotiations have been of a three-sided character, dealing not only with the trade relations between the United States and Spain but also with arrangements for a French credit in Spain.

The American representatives have been able, in addition to securing considerable amounts of desired supplies for General Pershing's forces in Spain and satisfactorily arranging the problems of American exports and imports, to materially assist the French Government in securing a large credit in Spain to finance payments for the supplies which the republic draws from Spanish sources.

Free Export to Allies.—Under the agreement Spain permits free export to the Allies of pyrites, minerals, and manufactured wool, a concession of decided value to the Entente powers, and the export to the extent permitted by home requirements of various other commodities, in addition to the specific licensing of the supplies required by General Pershing. In return, the United States assures to Spain its necessary supplies of cotton and

petroleum, the amount of the monthly export of these commodities being fixed in the agreement at a figure which will cover the genuine Spanish requirements, but bar the possibility of German agents in Spain secretly buying up and hoarding a stock of cotton against the time of the conclusion of peace. Spain is granted other supplies to the extent that they can be spared after satisfying home requirements in the United States and providing for the needs of its associates in the war.

As has already been stated, special concessions have been made in regard to locomotives and railway material, which are required to increase the carrying capacity of the Spanish railway system, a measure of decided importance to America and its associates, which are drawing supplies from Spanish territory.

The agreement has been practically completed for some time, but as the Spanish Minister of Finance, whose signature was required to the agreement, was one of the ministers affected by the cabinet changes last week, ratification had been delayed until the new minister had been installed and had had opportunity to consider the final text.—*Official Bulletin*, 9/3.

THE SITUATION IN SPAIN.—Madrid despatches of February 21 stated that three notes relative to submarine sinkings had been forwarded to Germany. The first referred to the Italian S. S. *Duca di Genova* sunk February 10 in Spanish territorial waters; the second to the *Giralda* sunk January 28 while engaged in coastwise traffic; and the third to the loss of the *Ceferino* on February 13. Further indications of submarine activity against Spanish shipping were the sinking on February 22 of the Spanish vessel *Mar-Caspio* (2723 tons) on her way to New York with a cargo of cork, the loss of the *Neguire* (1859 tons) on the following day, and the announcement from Berne on March 2 that a Spanish ship had been sunk while under charter by the Swiss Government with a cargo of wheat for Switzerland.

The general elections in Spain on February 24 gave the Liberal Democrats 93 seats in Parliament; Dato Conservatives, 86; Romanones Liberals, 35; Republicans, 33. According to reports, Germanophile candidates were everywhere defeated. The Alhucemas Cabinet, which had been in office since the preceding April, resigned on February 28, owing to disagreement over a change of policy toward Germany. It was reconstructed with two changes, resigned again on March 8, and was again patched together on March 10.

An article by Dr. Dillon in the February *Nineteenth Century* spoke despairingly of the complete political apathy of the Spanish people. The country lay subject to the control of a junta in the Spanish Army. Labor conditions were slightly improved by the call for Spanish workmen in France.

THE NORTHERN NEUTRALS

EFFECT OF TRADE AGREEMENTS WITH SCANDINAVIA.—The trade agreement between the Allies and Norway provided that Norway should receive 10,000,000 bushels of wheat and rice and certain specified amounts of meat, cotton, wool, sugar, oil, lead, and other commodities. In return, she promised that no part of these imports should reach the Central Powers, and no food whatever except 28,000 tons of fish per annum.

Referring to the effect upon Germany, and the bitter attacks on the northern neutrals in the German press, the *N. Y. Times* of March 12 wrote as follows:

"What have the Central Powers lost? For a long time Germany was importing iron of fine quality from Sweden, receiving from that source, it is estimated, more than half of the quantity consumed in her munition factories. Norway sold to her food, nickel for torpedoes, and other metals. A daily meat train crossed the boundary from Denmark, and food of many kinds came in from Holland. These supplies are reduced by at least 75 per cent, owing mainly to the new agreements, although the neutrals now have not so much to sell. At the same time Germany sees 2,100,000 tons of Norwegian, Dutch, and Swedish shipping, about 400 vessels, chartered to our government or the Allies. Many of these will carry foodstuffs to Germany's foes in Europe, and some will release American ships for the transportation of troops to France.

"All of these countries—even Sweden, whose royal family, aristocracy, and army have been pro-German—must now expect Germany's hostility. How will it be shown? Warning has been given that their ships will be torpedoed. But this will not be a new manipulation of enmity, for nearly 1300 of their vessels have already been sunk; and several thousand sailors went down with them or were killed in life-boats. Norway lost 12 ships last month. There is complaint at Berlin that the Norwegian press 'minimizes German successes.' It has not minimized the destruction of 726 ships."—*N. Y. Times*, 12/3.

NETHERLANDS

DUTCH SHIPS TAKEN OVER BY ALLIES.—Washington, March 14.—The United States and Great Britain have notified Holland of their intention to take over Dutch ships in American and Entente ports on March 18, unless Holland is able to reach a definite agreement regarding the vessels by that time.

There are 2,000,000 tons of Dutch shipping, but only 600,000 will be seized next Monday. The remaining 1,400,000 tons in Dutch ports will not be touched. It is only the purpose to take over the 400,000 tons in American ports and the 200,000 tons in Entente ports.

The decision of the American and British Governments is based on the fact that this tonnage is vitally needed and the fact that Germany has refused to permit the Dutch Government to live up to the modus vivendi into which Holland recently entered.

The American Government and its co-belligerents have been influenced by the fact that Holland is obviously in a state of duress and has been so terrorized by the German submarine menace that she fears to put into effect the voluntary agreement with the Allies regarding the ships. This agreement provided for food supplies for Holland and contained other benefits for that country. It provided for the departure of Dutch ships now in Dutch waters to replace Dutch ships sailing from this side with supplies for Holland and for Belgian relief, a step for which the justification is obvious when it is considered that, otherwise, the Dutch ships now on this side of the Atlantic would gradually have been transferred to German control upon reaching harbors on the other side which can be largely sealed up by German submarines.—*N. Y. Times*, 15/3.

HOLLAND OFFERS TO GIVE UP SHIPS.—Holland, on the eve of her shipping being taken over by the United States and Great Britain, has given evidences of a readiness to make a voluntary agreement to that purpose, even agreeing that the ships shall be sent through the war zone.

In view of the continued pressure upon the Netherlands by Germany in opposition to such a step, officials here were mystified at the sudden change in the situation.

It was stated that Holland probably would make liberal concessions to Germany, but it was feared that the sudden acquiescence with the long-opposed provision that the ships be sent through the war zone might indi-

cate that the Netherlands Government was proposing something new in connection with the negotiations which Great Britain and the United States would be unable to accept.

It was stated that if Holland desires to turn over the ships on the terms already laid down, by voluntary agreement, it would be considered very agreeable, but that they must be taken over Monday on the final terms presented by the American and British diplomatic representatives.—*Washington Post*, 17/3.

GERMANY

GERMANY'S HUGE DEBT.—The financial status of Germany was clearly analyzed by Professor E. L. Bogert, of the University of Illinois, in the *N. Y. Times* of March 14. Between August 1, 1914, and December 1, 1917, the Reichstag had granted ten votes of credit appropriating money for the use of the government, aggregating 109,000,000,000 marks or $27,000,000,000. The recent vote of an additional 15,000,000,000 marks brought the total to $31,000,000,000.

Since a small part of this expenditure has been met by taxation, a better indication of the war debt is given by the loans negotiated by the Imperial Government. These, occurring with clock-like regularity every March and September, have been ten in number, amounting in all to $18,340,415,000. Of the discrepancy of 12½ billion dollars between these loans and the expenditures, not more than one billion can be accounted for by taxation, leaving between 11 and 12 billion dollars of floating debt.

While these figures make it evident that the imperial debt of Germany has not yet reached the sum of 124,000,000,000 marks, it is evident that it has already passed the limit of 100,000,000,000 marks which Herr Rudolph Haverstein, President of the Reichsbank, thought was all that Germany could stand, and which he was sure would never be reached. If this figure be compared with the modest debt of $1,250,000,000 which Germany owed before the war, some measure of the financial burden imposed upon the empire can be gained. And this figure does not take into account the debts of the separate states or of the communes, which are already large and steadily growing.

The total budget of the Imperial German Government in 1913-1914 was $830,000,000; the interest on the existing debt is already $900,000,000, and the next loan will bring it up to $1,000,000,000 annually, or more than all the peace and military expenditures before the war. Existing taxes are insufficient to meet these demands, and interest is being paid out of new loans. Whether this situation will lead to repudiation or not, no man can now decide. But it is certain that the financial position of Germany, deprived of her expected indemnities, will be a desperate one after the war.

PRUSSIAN SUFFRAGE REFORM BEATEN IN DIET COMMITTEE.—Amsterdam, February 21.—The Franchise Committee of the lower house of the Prussian Diet has accepted by a vote of 20 to 15 the Conservatives' substitute proposal for a system of plural voting and representation based on professions and guilds, according to a Berlin telegram to-day.

Consequently the government's proposal, which provided for equal suffrage, was declared "disposed of."

GREAT BRITAIN

LLOYD GEORGE WEATHERS CRISIS.—At the close of February, the British Government was subjected to sharp opposition, centering in the resignation of General Robertson as Chief-of-Staff and the shift of Admiral Jellicoe

from the position of First Sea Lord. General Robertson's resignation was due to his disapproval of the powers given to the Versailles War Council.

A vote in Parliament on February 19, on a resolution expressing disapproval of the position taken by the Versailles Council toward German peace offers, sustained the Council and the British Ministry by 159 to 28. Referring to the powers of the Council, Mr. Lloyd George spoke as follows:

"'The general principle laid down at Versailles was agreed to wholeheartedly by everybody. There was no conflict as regarded the policy, but only as to the method of giving effect to it. There was agreement as to the policy; there was agreement that there must be central authority to exercise supreme direction of that policy; there was agreement that authority must be inter-allied authority, and there was complete agreement that that authority should have executive power. The only question that arose was as to how that central authority should be constituted.'

"The Premier asserted that the conclusions reached at Versailles were the result of very powerful representations by the delegates of other governments, notably the American Government.

"'I hesitated for some time,' said the Premier in referring to the American representations, 'whether I should not read in the House of Commons the very cogent document submitted by the American delegation, which put the case for the present proposal. It is one of the ablest documents ever submitted to a military conference. The only reason why I do not read it to the House is that it is mixed with the plan of operations.'

"'The case is presented with irresistible power and logic,' he added. 'What happened? We altered the proposal here and there. There was a good deal of discussion, which took some hours. There was not a single dissentient voice, so far as the plan was concerned.'

"The British commander, Field Marshal Sir Douglas Haig, was present at the session of the Supreme War Council, Mr. Lloyd George went on. He drew attention to two weak points in the proposal, which were thereupon adjusted by the conference. General Robertson was present when the decision was reported to the War Cabinet and did not object.

"It was agreed, said Mr. Lloyd George, that the permanent military adviser at Versailles should be a member of the Army Council. It was a part of this arrangement that the Chief of the Imperial Staff was to remain the supreme military adviser to the government.

"General Robertson, said the Premier, suggested a modification of the proposal by making the representative at Versailles a deputy of the Chief of Staff. The government felt bound to reject this suggestion, as it involved putting a subordinate in a position of the first magnitude, which might impose upon him the necessity of making vital decisions under instruction given him before the full facts were known.

"Being under the impression that all the difficulties had been overcome, continued the Premier, the government offered General Robertson a position on the Versailles Council, but he was unwilling to acquiesce in the system, objecting to it on military grounds. General Robertson, the Premier added, then refused the post of Chief of Staff with the powers which the Versailles conferences had decided to be proper to it.

"The country, said the Premier, was faced with terrible realities. He begged the House to have done with all controversy, adding that the government was entitled to know to-night whether the House and the country wished it to proceed with the policy deliberately arrived at.

"If the House of Commons repudiated the policy for which he was responsible, on which he believed the safety of the country depended, Mr. Lloyd George declared he would quit office. His one regret would be that he had not greater strength and ability to place at the disposal of his country in its gravest hour."—*N. Y. Times*, 20/2.

LABOR CONFERENCE BACKS ALLIED WAR AIMS.—The Inter-Allied Labor Conference, representing the Socialist or Labor parties of France, England, Italy, Belgium, Portugal, and South Africa, met in London during the week ending February 23. The war aims, practically endorsing those of the British Labor Conference on December 28, are stated as involving the establishment of a league of nations, with international cooperation for disarmament and the prevention of future warfare; the restoration of Belgium, Servia, Rumania, and Montenegro; the determination of future territorial changes to be based on justice and right, and the repudiation of economic boycotts after the war. Arthur Henderson, leader of the British Labor Party; Albert Thomas, the French delegate; and Emile Vandervelde, Socialist leader in the Belgian Chamber of Deputies, were the most influential leaders of the conference. It was voted to convene an immediate conference between the Socialists of the Allies and of Germany; to call an international Socialist conference to sit concurrently with the future official peace conference; and to demand that a Socialist representative be included by every nation in its official delegation to the peace conference. A delegation of five members, headed by Camille E. Huysmans, secretary of the international Socialist organization, is to be sent to the United States "for the purpose of conferring with the representatives of the American democracy on the war situation."—*N. Y. Nation*, 7/3.

JAPAN

JAPAN STILL REFRAINS FROM SIBERIAN ACTION.—Japan has not come to a decision regarding the dispatch of troops to Siberia, Premier Terauchi declared in replying to a question in the House of Representatives, according to a *Reuter* dispatch from Shanghai carrying Tokio advices under date of March 9.

The government, said the premier, would "take the utmost care and precaution in dealing with this momentous situation."

The agitation in favor of active measures against the German eastern menace continues. Professor Juretsu Shiga, of the Tokio Higher Technical School, affirms that the greatest crisis in the history of the country is approaching, and that this is no time for the 60,000,000 Japanese to go out looking for plums and cherry blossoms and taking life easy.

The *Japan Advertiser* says that Japan cannot stand off in splendid isolation while the rest of the world is in travail.

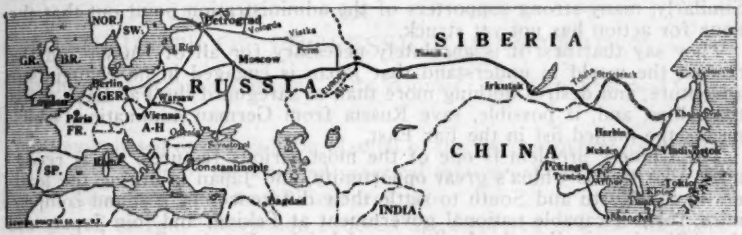
The *Yorozu Shimbun* says:

"When a fire starts in your neighbor's house can you still remain in bed?" It acknowledges that a more active participation in the war would lead to economical disadvantages, but says it is a bigger problem than mere economics, being a question of life and death. Though it might be economically disadvantageous, the paper asks, "which will be better to sacrifice, wealth and future advantage or to take measures to prevent permanent anxiety and possibly the utter ruin of the country?"—*Washington Evening Star*, 12/3.

JAPANESE INTERVENTION IN SIBERIA

NEGOTIATIONS WITH THE ALLIES.—On February 24, following the capitulation of Russia to Germany, Viscount Motono, Japanese Foreign Minister, stated that, if peace were ratified, "it goes without saying Japan will take steps of the most decided, most adequate character, to meet the occasion." Such action would have for its object protection of munitions and supplies shipped by the Allies to Russia and lying at Vladivostok and other points along the Trans-Siberian railway.

In accordance with this purpose, Japan during the last week in February directed informal inquiries to the Allied Powers. Press reports indicated that Great Britain and France were favorable to such action, but were of the opinion that difficulties would be avoided if Japan gave assurances of her intention to evacuate Russian territory when the emergency had passed.



JAPAN'S RELATION TO THE EUROPEAN CONFLICT.

From *Literary Digest*, March 16.

On March 5, Washington despatches stated that the United States Government, by means of informal conversations with the Japanese Foreign Office, had withheld consent to such a move, on the grounds that it was not clearly justified as an effective move against Germany, might further alienate Russia, and might be construed as inconsistent with the stated war aims of the Allies. The attitude of the United States was further indicated by President Wilson's friendly note of March 11 to the Russian Congress.

CHINA'S ATTITUDE.—China at a Cabinet Meeting on March 5 decided to despatch 20,000 troops with the Japanese expedition. Japanese and Chinese troops were already cooperating in control of that part of the Trans-Siberian railway traversing northern Manchuria—a move which gave control of the Siberian railway further east. China assumed control of the railway at Harbin on January 26.

BRITISH OPINION FAVORABLE TO INTERVENTION.—In a statement to the press on March 8, Lord Robert Cecil, Minister of Blockade, called attention to the possibilities opened up by Germany's peace compacts in the east, and strongly advocated Japanese occupation of Siberia. Speaking more guardedly in Parliament on March 14, Foreign Minister Balfour expressed perfect confidence in Japan's absolute loyalty in carrying out any decision that might be reached, and declared that in this question he had drawn no distinction between Japan and the other Allies.

MODERATE FEELING IN JAPAN.—Tokio, March 16.—Premier Terauchi and Foreign Minister Motono told Parliament to-day that nothing had been decided upon with reference to the Siberian situation.

Japan realizes, it is authoritatively stated, that if the United States declines its support, the situation will be extremely delicate because financial and material assistance must come from America. Any feeling of distrust

or unfriendliness seems to be lacking. A large section of influential men in Japan favor the American viewpoint, while only a few chauvinists jeer at Premier Terauchi and Foreign Minister Motono as being under American influence.

Leading men, such as Baron Shibusawa, President of the American-Japanese Association, for the commercial section, and Yukio Ozaki, leader of the Constitutional Party, for the "outs," advocate extreme caution. Similarly, many strong supporters of the administration point out that the hour for action has not yet struck.

They say that first it is absolutely necessary for all of Russia and the rest of the world to understand that Japan is engaged in no chauvinistic adventure, and desires nothing more than to safeguard the Far East, assist the Allies, and, if possible, save Russia from German domination, which means the mailed fist in the Far East.

The Chinese problem is one of the most serious features. It is recognized that this is China's great opportunity, and Japan is urging the leaders in the North and South to settle their differences by a sound compromise, form a capable national government at Peking, and join Japan and the Allies in guarding the frontiers and helping Russia. Some indications are manifest that this effort may be successful.—*N. Y. Times,* 17/3.

REVIEW OF BOOKS

ON

SUBJECTS OF PROFESSIONAL INTEREST

"Military Observation Balloons." By Widmer. (D. Van Nostrand Company, 1917.)

This book, based on the Balloon Manual of the German Army, contains a detailed description of the kite and spherical captive balloons in use by the German Army just prior to the European war.

As is well known, observation balloons are employed in great numbers by the contending armies, and their importance and usefulness are unquestioned. As stated by the publishers, keen students of the present war believe that the struggle will be won in the air. However, it is doubtful if observation balloons are entitled to be considered in this connection. The supremacy of the air depends on the strength and effectiveness of the airplane forces, and observation balloons cannot be used at all, where the opposing side has a marked superiority in this respect.

Probably there is little information contained in this volume, not already familiar to military aeronauts. The ground drill, maneuver, and ceremonies pertaining to balloon companies is treated in some detail, although there seems to be little necessity for such details, and they appear to be of no importance in connection with the use of balloons.

The inspection of balloon fabric, and the care and preservation of balloons, including precautions to be observed during storage, are treated with great care and attention to detail.

The chapter on the use of kite balloons in war, is, perhaps, the most interesting part of the text to military men. The author confesses serious difficulties in obtaining clear observations from balloons, and in distinguishing troops, except during movement, from natural features of the terrain. No reference is made with regard to protection against the attack of airplanes, or to the use of the parachute or other safety precautions for the observers.

The book furnishes a good illustration of the care and thoroughness employed by the German Army in every detail of their military preparations.

W. P. U.

"The Marvel Book of American Ships." By Captain Orton P. Jackson, U. S. Navy, and Major Frank E. Evans, U. S. M. C. 391 pages and 436 illustrations; 12 plates in full color. (Frederick A. Stokes Company, 1917.)

A very interesting, non-technical and comprehensive book, describing fully all phases of the building of ships from the laying of the keel to the completed ship, whether it be man-of-war, merchantman or pleasure craft.

The history and description of all classes of ships is interestingly written

and well illustrated, as are also the chapters descriptive of the making of the man-o'-war's man and officer.

The accounts of the life on board ship, in camps, target practice, travels, pleasures and tragedies of the sea, the seven great sea battles, and numerous other subjects which pertain to the sea, hold the reader's attention throughout.

The book also contains two charts showing the house flags and markings of funnels of the principal steamship lines of the world, also one showing the international code flags and pennants, ensigns and national merchant marine flags of the principal maritime nations.

Summary: Comprehensive description of the classes of ships, ship life, countless other subjects pertaining to the sea; illustrations are excellent; reading interesting as well as instructive and time well spent.

G. C. P.

NOTICE

The U. S. Naval Institute was established in 1873, having for its object the advancement of professional and scientific knowledge in the Navy. It is now in its forty-fifth year of existence, trusting as heretofore for its support to the officers and friends of the Navy. The members of the Board of Control cordially invite the co-operation and aid of their brother officers and others interested in the Navy, in furtherance of the aims of the Institute, by the contribution of papers and communications upon subjects of interest to the naval profession, as well as by personal support and influence.

On the subject of membership the Constitution reads as follows:

ARTICLE VII

Sec. 1. The Institute shall consist of regular, life, honorary and associate members.

Sec. 2. Officers of the Navy, Marine Corps, and all civil officers attached to the Naval Service, shall be entitled to become regular or life members, without ballot, on payment of dues or fees to the Secretary and Treasurer. Members who resign from the Navy subsequent to joining the Institute will be regarded as belonging to the class described in this Section.

Sec. 3. The Prize Essayist of each year shall be a life member without payment of fee.

Sec. 4. Honorary members shall be selected from distinguished Naval and Military Officers, and from eminent men of learning in civil life. The Secretary of the Navy shall be, *ex officio*, an honorary member. Their number shall not exceed thirty (30). Nominations for honorary members must be favorably reported by the Board of Control. To be declared elected, they must receive the affirmative vote of three-quarters of the members represented at regular or stated meetings, either in person or by proxy.

Sec. 5. Associate members shall be elected from Officers of the Army, Revenue Cutter Service, foreign officers of the Naval and Military professions, and from persons in civil life who may be interested in the purposes of the Institute.

Sec. 6. Those entitled to become associate members may be elected life members, provided that the number not officially connected with the Navy and Marine Corps shall not at any time exceed one hundred (100).

Sec. 7. Associate members and life members, other than those entitled to regular membership, shall be elected as follows: "Nominations shall be made in writing to the Secretary and Treasurer, with the name of the member making them, and such nominations shall be submitted to the Board of Control. The Board of Control will at each regular meeting ballot on the nominations submitted for election, and nominees receiving a majority of the votes of the board membership shall be considered elected to membership in the United States Naval Institute."

Sec. 8. The annual dues for regular and associate members shall be two dollars and fifty cents, all of which shall be for a year's subscription to the UNITED STATES NAVAL INSTITUTE PROCEEDINGS, payable upon joining the Institute, and upon the first day of each succeeding January. The fee for life membership shall be forty dollars, but if any regular or associate member has paid his dues for the year in which he wishes to be transferred to life membership, or has paid his dues for any future year or years, the amount so paid shall be deducted from the fee for life membership.

ARTICLE X

Sec. 2. One copy of the PROCEEDINGS, when published, shall be furnished to each regular and associate member (in return for dues paid), to each life member (in return for life membership fee paid), to honorary members, to each corresponding society of the Institute, and to such libraries and periodicals as may be determined upon by the Board of Control.

The PROCEEDINGS are published monthly; subscription for non-members, $3.00; enlisted men, U. S. Navy, $2.50. Single copies, by purchase, 30 cents; issues preceding January, 1918, 50 cents.

All letters should be addressed U. S. Naval Institute, Annapolis, Md., and all checks, drafts, and money orders should be made payable to the same.

SPECIAL NOTICE

NAVAL INSTITUTE PRIZE ESSAY, 1919

A prize of two hundred dollars, with a gold medal, and a life-membership (unless the author is already a life member) in the Institute, is offered by the Naval Institute for the best essay on any subject pertaining to the naval profession published in the PROCEEDINGS during the current year. The prize will be in addition to the author's compensation paid upon publication of the essay.

On the opposite page are given suggested topics. Essays are not limited to these topics and no additional weight will be given an essay in awarding the prize because it is written on one of these suggested topics over one written on any subject pertaining to the naval profession.

The following rules will govern this competition:

1. All essays published in the PROCEEDINGS during 1918, which are deemed by the Board of Control to be of sufficient merit, will be passed upon by the Board during the month of January, 1919, and the award for the prize will be made by the Board of Control, voting by ballot.

2. No essay received after November 1 will be available for publication in 1918. Essays received subsequent to November 1, if accepted, will be published as soon as practicable thereafter.

3. If, in the opinion of the Board of Control, the best essay published during 1918 is not of sufficient merit to be awarded the prize, it may receive "Honorable Mention," or such other distinction as the Board may decide.

4. In case one or more essays receive "Honorable Mention," the writers thereof will receive a minimum prize of seventy-five dollars and a life-membership (unless the author is already a life member) in the Institute, the actual amounts of the awards to be decided by the Board of Control in each case.

5. Essays are limited to fifty (50) printed pages in the PROCEEDINGS of the Institute.

6. It is requested that all essays be submitted typewritten and in duplicate; essays submitted written in longhand and in single copy will, however, receive equal consideration.

7. In the event of the prize being awarded to the winner of a previous year, a gold clasp, suitably engraved, will be given in lieu of the gold medal.

By direction of the Board of Control.

G. M. RAVENSCROFT,
Lieut. Commander, U. S. N., Secretary and Treasurer.

PRIZE ESSAY TOPICS

SUGGESTED AT THE INVITATION OF THE BOARD OF CONTROL

BY

THE PRESIDENT OF THE NAVAL INSTITUTE, THE SUPERINTENDENT OF THE NAVAL ACADEMY, THE PRESIDENT OF THE NAVAL WAR COLLEGE, AND THE COMMANDERS-IN-CHIEF OF THE ATLANTIC, PACIFIC AND ASIATIC FLEETS.

"The Place of the Naval Officer in International Affairs."

"The Evolution of Naval Doctrine from National Character."

"The Training of Enlisted Personnel to Produce Modern Man-o'-Warsmen: (a) Military Training; (b) Moral Training; (c) Education."

"The Organization, Employment and Training of Reserve Fleets and Flotillas."

LIST OF PRIZE ESSAYS

"WHAT THE NAVY HAS BEEN THINKING ABOUT"

1879

Naval Education. Prize Essay, 1879. By Lieut. Commander A. D. Brown, U. S. N.

NAVAL EDUCATION. First Honorable Mention. By Lieut. Commander C. F. Goodrich, U. S. N.

NAVAL EDUCATION. Second Honorable Mention. By Commander A. T. Mahan, U. S. N.

1880

"The Naval Policy of the United States." Prize Essay, 1880. By Lieutenant Charles Belknap, U. S. N.

1881

The Type of (I) Armored Vessel, (II) Cruiser Best Suited to the Present Needs of the United States. Prize Essay, 1881. By Lieutenant E. W. Very, U. S. N.

SECOND PRIZE ESSAY, 1881. By Lieutenant Seaton Schroeder, U. S. N.

1882

Our Merchant Marine: The Causes of Its Decline and the Means to Be Taken for Its Revival. "Nil clarius aquis." Prize Essay, 1882. By Lieutenant J. D. Kelley, U. S. N.

"MAIS IL FAUT CULTIVER NOTRE JARDIN." Honorable Mention. By Master C. G. Calkins, U. S. N.

"SPERO MELIORA." Honorable Mention. By Lieut. Commander F. E. Chadwick, U. S. N.

"CAUSA LATET: VIS EST NOTISSIMA." Honorable Mention. By Lieutenant R. Wainwright, U. S. N.

1883

How May the Sphere of Usefulness of Naval Officers Be Extended in Time of Peace with Advantage to the Country and the Naval Service? "Pour encourager les Autres." Prize Essay, 1883. By Lieutenant Carlos G. Calkins, U. S. N.

"SEMPER PARATUS." First Honorable Mention. By Commander N. H. Farquhar, U. S. N.

"CULIBET IN ARTE SUA CREDENDUM EST." Second Honorable Mention. By Captain A. P. Cooke, U. S. N.

1884

The Reconstruction and Increase of the Navy. Prize Essay, 1884. By Ensign W. I. Chambers, U. S. N.

1885

Inducements for Retaining Trained Seamen in the Navy, and Best System of Rewards for Long and Faithful Service. Prize Essay, 1885. By Commander N. H. Farquhar, U. S. N.

1886

What Changes in Organization and Drill Are Necessary to Sail and Fight Effectively Our Warships of Latest Type? "Scire quod nescias." Prize Essay, 1886. By Lieutenant Carlos G. Calkins, U. S. N.

THE RESULT OF ALL NAVAL ADMINISTRATION AND EFFORTS FINDS ITS EXPRESSION IN GOOD ORGANIZATION AND THOROUGH DRILL ON BOARD OF SUITABLE SHIPS. Honorable Mention. By Ensign W. L. Rodgers, U. S. N.

1887

The Naval Brigade: Its Organization, Equipment and Tactics. "In hoc signo vinces." Prize Essay, 1887. By Lieutenant C. T. Hutchins.

1888

Torpedoes. Prize Essay, 1888. By Lieut. Commander W. W. Reisinger, U. S. N.

1891

The Enlistment, Training and Organization of Crews for Our Ships of War. Prize Essay, 1891. By Ensign A. P. Niblack, U. S. N.

DISPOSITION AND EMPLOYMENT OF THE FLEET: SHIP AND SQUADRON DRILL. Honorable Mention, 1891. By Lieutenant R. C. Smith, U. S. N.

1892

Torpedo-boats: Their Organization and Conduct. Prize Essay, 1892. By Wm. Laird Clowes.

1894

The U. S. S. Vesuvius, with Special Reference to Her Pneumatic Battery. Prize Essay, 1894. By Lieut. Commander Seaton Schroeder, U. S. N.

NAVAL REFORM. Honorable Mention, 1894. By Passed Assistant Engineer F. M. Bennett, U. S. N.

1895

Tactical Problems in Naval Warfare. Prize Essay, 1895. By Lieut. Commander Richard Wainwright, U. S. N.

A SUMMARY OF THE SITUATION AND OUTLOOK IN EUROPE. An Introduction to the Study of Coming War. Honorable Mention, 1895. By Richmond Pearson Hobson, Assistant Naval Constructor, U. S. N.

SUGGESTIONS FOR INCREASING THE EFFICIENCY OF OUR NEW SHIPS. Honorable Mention, 1895. By Naval Constructor Wm. J. Baxter, U. S. N.

THE BATTLE OF THE YALU. Honorable Mention, 1895. By Ensign Frank Marble, U. S. N.

1896

The Tactics of Ships in the Line of Battle. Prize Essay, 1896. By Lieutenant A. P. Niblack, U. S. N.

THE ORGANIZATION, TRAINING AND DISCIPLINE OF THE NAVY PERSONNEL AS VIEWED FROM THE SHIP. Honorable Mention, 1896. By Lieutenant Wm. F. Fullam, U. S. N.

NAVAL APPRENTICES, INDUCEMENTS, ENLISTING AND TRAINING. The Seaman Branch of the Navy. Honorable Mention, 1896. By Ensign Ryland D. Tisdale, U. S. N.

THE COMPOSITION OF THE FLEET. Honorable Mention 1896. By Lieutenant John M. Ellicott, U. S. N.

1897

Torpedo-boat Policy. Prize Essay, 1897. By Lieutenant R. C. Smith, U. S. N.

A PROPOSED UNIFORM COURSE OF INSTRUCTION FOR THE NAVAL MILITIA. Honorable Mention, 1897. By H. G. Dohrman, Associate Member, U. S. N. I.

TORPEDOES IN EXERCISE AND BATTLE. Honorable Mention, 1897. By Lieutenant J. M. Ellicott, U. S. N.

1898

Esprit de Corps: A Tract for the Times. Prize Essay, 1898. By Captain Caspar Frederick Goodrich, U. S. N.

OUR NAVAL POWER. Honorable Mention, 1898. By Lieut. Commander Richard Wainwright, U. S. N.

TARGET PRACTICE AND THE TRAINING OF GUN CAPTAINS. Honorable Mention, 1898. By Ensign R. H. Jackson, U. S. N.

1900

Torpedo Craft: Types and Employment. Prize Essay, 1900. By Lieutenant R. H. Jackson, U. S. N.

THE AUTOMOBILE TORPEDO AND ITS USES. Honorable Mention, 1900. By Lieutenant L. H. Chandler, U. S. N.

1901

Naval Administration and Organization. Prize Essay, 1901. By Lieutenant John Hood, U. S. N.

1903

Gunnery in Our Navy. The Causes of Its Inferiority and Their Remedies. Prize Essay, 1903. By Professor Philip R. Alger, U. S. N.

A NAVAL TRAINING POLICY AND SYSTEM. Honorable Mention, 1903. By Lieutenant James H. Reid, U. S. N.

SYSTEMATIC TRAINING OF THE ENLISTED PERSONNEL OF THE NAVY. Honorable Mention, 1903. By Lieutenant C. L. Hussey, U. S. N.

OUR TORPEDO-BOAT FLOTILLA. The Training Needed to Insure Its Efficiency. Honorable Mention, 1903. By Lieutenant E. L. Beach, U. S. N.

1904

The Fleet and Its Personnel. Prize Essay, 1904. By Lieutenant S. P. Fullinwider, U. S. N.

A PLEA FOR A HIGHER PHYSICAL, MORAL AND INTELLECTUAL STANDARD OF THE PERSONNEL FOR THE NAVY. Honorable Mention, 1904. By Medical Inspector Howard E. Ames, U. S. N.

1905

American Naval Policy. Prize Essay, 1905. By Commander Bradley A. Fiske, U. S. N.

THE DEPARTMENT OF THE NAVY. Honorable Mention, 1905. By Rear Admiral Stephen B. Luce, U. S. N.

1906

Promotion by Selection. Prize Essay, 1906. By Commander Hawley O. Rittenhouse, U. S. N.

THE ELEMENTS OF FLEET TACTICS. First Honorable Mention, 1906. By Lieut. Commander A. P. Niblack, U. S. N.

GLEANINGS FROM THE SEA OF JAPAN. Second Honorable Mention, 1906. By Captain Seaton Schroeder, U. S. N.

THE PURCHASE SYSTEM OF THE NAVY. Third Honorable Mention, 1906 By Pay Inspector J. A. Mudd, U. S. N.

1907

Storekeeping at the Navy Yards. Prize Essay, 1907. By Pay Inspector John A. Mudd, U. S. N.

BATTLE REHEARSALS. A Few Thoughts on Our Next Step in Fleet-Gunnery. First Honorable Mention, 1907. By Lieut. Commander Yates Stirling, U. S. N.

THE NAVAL PROFESSION. Second Honorable Mention, 1907. By Commander Bradley A. Fiske, U. S. N.

1908

A Few Hints to the Study of Naval Tactics. Prize Essay, 1908. By Lieutenant W. S. Pye, U. S. N.

THE MONEY FOR THE NAVY. First Honorable Mention, 1908. By Pay Inspector John A. Mudd, U. S. N.

THE NATION'S DEFENCE—THE OFFENSIVE FLEET. How Shall We Prepare It for Battle? Second Honorable Mention, 1908. By Lieut. Commander Yates Stirling, U. S. N.

1909

Some Ideas about Organization on Board Ship. Prize Essay, 1909. By Lieutenant Ernest J. King, U. S. N.

THE NAVY AND COAST DEFENCE. Honorable Mention, 1909. By Commodore W. H. Beehler, U. S. N.

THE REORGANIZATION OF THE NAVAL ESTABLISHMENT. Honorable Mention, 1909. By Pay Inspector J. A. Mudd, U. S. N.

A PLEA FOR PHYSICAL TRAINING IN THE NAVY. Honorable Mention, 1909. By Commander A. P. Niblack, U. S. N.

1910

The Merchant Marine and the Navy. Prize Essay, 1910. By Naval Constructor T. G. Roberts, U. S. N.

THE NAVAL STRATEGY OF THE RUSSO-JAPANESE WAR. Honorable Mention, 1910. By Lieutenant Lyman A. Cotton, U. S. N.

1911

Navy Yard Economy. Prize Essay, 1911. By Paymaster Charles Conard, U. S. N.

NAVAL POWER. Honorable Mention, 1911. By Captain Bradley A. Fiske, U. S. N.

WANTED—FIRST AID. Honorable Mention, 1911. By Commander C. C. Marsh, U. S. N.

1912

Naval Might. Prize Essay, 1912. By Lieutenant Ridgely Hunt, U. S. N. (retired).

INSPECTION DUTY AT THE NAVY YARDS. Honorable Mention, 1912. By Lieut. Commander T. D. Parker, U. S. N.

1913

The Greatest Need of the Atlantic Fleet. Prize Essay, 1913. By Lieut. Commander Harry E. Yarnell, U. S. N.

NAVY DEPARTMENT ORGANIZATION. A Study of Principles. First Honorable Mention, 1913. By Commander Yates Stirling, Jr., U. S. N.

TRAINED INITIATIVE AND UNITY OF ACTION. Second Honorable Mention, 1913. By Lieut. Commander Dudley W. Knox, U. S. N.

1914

The Great Lesson from Nelson for To-day. Prize Essay, 1914. By Lieut. Commander Dudley W. Knox, U. S. N.

NAVAL POLICY AS IT RELATES TO THE SHORE ESTABLISHMENT AND THE MAINTENANCE OF THE FLEET. Honorable Mention, 1914. By Captain John Hood, U. S. N.

OLD PRINCIPLES AND MODERN APPLICATIONS. Honorable Mention, 1914. By Lieut. Commander Dudley W. Knox, U. S. N.

MILITARY PREPAREDNESS. Honorable Mention, 1914. By Naval Constructor Richard D. Gatewood, U. S. N.

1915

The Rôle of Doctrine in Naval Warfare. Prize Essay, 1915. By Lieut. Commander Dudley W. Knox, U. S. N.

AN AIR FLEET: OUR PRESSING NAVAL WANT. First Honorable Mention, 1915. By Lieut. Commander Thomas Drayton Parker, U. S. N.

TACTICS. Second Honorable Mention, 1915. By Ensign H. H. Frost, U. S. N.

DEFENCE AGAINST SURPRISE TORPEDO ATTACK. Third Honorable Mention, 1915. By Ensign R. T. Merrill, 2d, U. S. N.

1916

The Moral Factor in War. Prize Essay, 1916. By Lieutenant (J. G.) H. H. Frost, U. S. N.

NAVAL PERSONNEL. First Honorable Mention, 1916. By Lieut. Commander J. K. Taussig, U. S. N.

EDUCATION AT THE U. S. NAVAL ACADEMY. Second Honorable Mention, 1916. By Lieutenant Ridgely Hunt, U. S. N.

SOME UNDERLYING PRINCIPLES OF MORALE. Third Honorable Mention, 1916. By Commander Dudley W. Knox, U. S. N.

LARGE *vs.* A GREATER NUMBER OF SMALLER BATTLESHIPS. Lippincott Prize Essay. By Lieut. Commander Thomas Lee Johnson, U. S. N.

1917

Commerce Destroying in War. Prize Essay, 1917. By Commander Lyman A. Cotten, U. S. Navy.

THE PEOPLE'S RÔLE IN WAR. First Honorable Mention, 1917. By Lieutenant H. H. Frost, U. S. Navy.

THE NATION'S GREATEST NEED. Second Honorable Mention, 1917. By Colonel Dion Williams, U. S. Marine Corps.

1918

Letters on Naval Tactics. Prize Essay, 1918. By Lieutenant H. H. Frost, U. S. N.

THE PREPAREDNESS OF THE FUTURE. First Honorable mention, 1918. By Commander H. O. Rittenhouse, U. S. N. Retired.

NAVAL STRATEGY. Second Honorable Mention, 1918. By Rear Admiral Bradley A. Fiske, U. S. N.

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